

AMERICAN FORESTRY

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PERCIVAL SHELDON RIDSDALE, Editor



IN STRONG CONTRAST TO THE GLEAMING HEIGHTS ABOVE ARE THE SENTINEL TREES WHICH NESTLE AT THE FOOT OF THE FAMOUS MISSION RANGE IN MONTANA

DECEMBER 1919

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CHRISTMAS ON MOUNT RAINIER

AMERICAN FORESTRY

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NATIONAL FORESTS AND THE WATER SUPPLY

BY SAMUEL T. DANA*

FEW people need to be reminded that the prosperity of the West depends largely upon an adequate supply of water for irrigation. Water, rather than land, is the open sesame to the agricultural development of the semiarid regions. Vast areas of rich soil await only water to make them "blossom like the rose." To other vast areas water has already been brought from varying distances, and these are now among the most productive of all our agricultural lands. Irrigation alone is responsible for the sugar-beet fields of Utah, the alfalfa fields of Idaho, and the orange groves of California.

So literally has water meant wealth to the Rocky Mountains and Pacific Coast States that the "Golden West" no longer need

base its claim to the title on the magic metal that brought it fame and prosperity in the early days. The gold of the grain field and of the citrus grove is now worth more than the gold of the mine. The \$247,000,000 which represents the annual value of the crops produced on the 150,000 farms comprising the 13,200,000 acres of irrigated land in the West is nearly three times as great as the value of the precious metals produced annually in the same region. Colorado, preeminently a land of minerals, now produces each year on irrigated lands a

crop worth more than the entire product of its mining industries and approximately twice as much as the output of precious metals. California, the "Golden State," contributes annually nearly four times as much wealth in crops as in precious metals.

If the precipitation were as evenly distributed in the West as it is in the East, there would not be the need

for irrigation that now exists, and the main purpose of the National Forests would be simply timber production. But it is not evenly distributed, and that is where the trouble lies. Except for a narrow strip along the Pacific Coast from San Francisco north to the Canadian line, the great bulk of the precipitation occurs in the mountains.



HOW THE FOREST GIVES SERVICE

What the National Forests mean to the water user may be summed up in one word "service"—service that is none the less real because it is not always obvious and because its exact value can not always be expressed in dollars and cents. Every user of water which originates in the National Forests—and this includes by far the greater number of water users throughout the West—must look to the Forests for safeguarding his supply.

Throughout the Coast Ranges, the Cascades and Sierra Nevadas, and the Rocky Mountains and Colorado Plateau the rain and snowfall is far greater than in the intermediate valleys and plateaus.

The result is that the majority of water users depend for their supply on water that originates a considerable distance away. Some of the most productive agricultural lands in the region receive hardly more than enough precipitation to support a desert vegetation, while the evaporation is correspondingly great. Greeley, Colorado;

*Courtesy U. S. Dept. of Agriculture, Forest Service.



WHAT WATER WILL DO. WITH—WHERE THE ORANGES GROW

The orange groves and other irrigated lands in the foreground obtain their water from the mountains in the background, which are included in the Angeles National Forest, California. At the lower elevations these mountains are covered with a dense growth of brush, or chaparral, while at the higher elevations are forests of western yellow pine, Jeffrey pine, and other trees. The value of citrus fruits produced in the eight southernmost counties of California in 1914 is estimated by the Los Angeles Chamber of Commerce to have been \$33,000,000.

Provo, Utah; Phoenix, Arizona, and Fresno and Riverside, California, all of which are in the center of extremely productive sections, have an annual precipitation of less than 15 inches with an annual evaporation from a free water surface at least three or four times as much.

As a natural consequence of the difference in amount of precipitation in the mountains and at the lower elevations, the former are generally forested and the latter treeless. The National Forests, of course, are located in the mountains, where the trees are. From the brush-covered foothills of the San Jacinto and San Bernardino Mountains in southern California to the magnificent Douglas fir forests of the Olympic Mountains in northern Washington, and from the pinon and juniper stands of the southern Rockies in New Mexico to the pine forests of the northern Rockies in Montana and Idaho, the mountains and the National Forests coincide.

An intimate relation exists between the National Forests and irrigated lands throughout the West. At least 85 per cent, and very likely more, of the water

used to irrigate these 13,200,000 acres, whether it comes from surface streams and lakes or from underground sources, has its origin in the mountains where the National Forests are located. Obviously, not all of this mountain area is forested, nor is all of the forested area under Federal ownership. At the same time, the National Forests include a large part of the area from which the bulk of the irrigation water is derived, and must therefore exert an important influence on the amount and character of the supply.

No figures are available as to the exact value added to these lands by the application of water, but it unquestionably runs into the hundreds of millions of dollars. Without water much of this area would be practically worthless, and the value even of that portion on which dry farming is feasible would be greatly reduced. In the vicinity of Salt Lake City, Utah, for example, irrigated lands deriving their water from the Wasatch National Forest are valued at from \$100 to \$1,000 per acre, with an average of probably \$400 per acre; while land without water in the same district, except where it requires drainage, is practically valueless. Near Los Angeles, California, unimproved lands with water rights are worth from \$200 to \$500 per acre, while bearing orange or lemon groves may be valued at \$3,000 or even more per acre. What the water supply protected by the Angeles National Forest



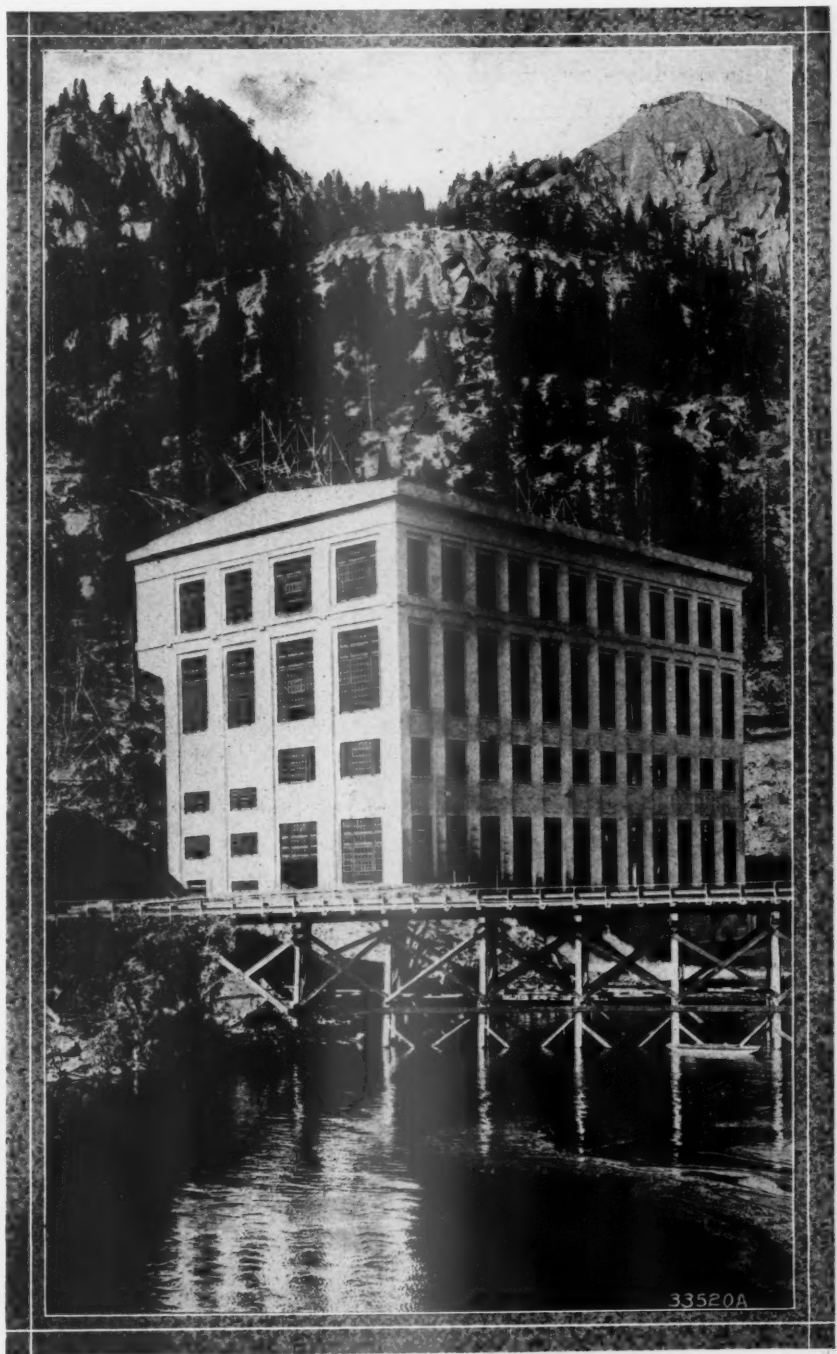
WITHOUT—WHERE THE AGAVES GROW

Semi-desert land near Silver City, New Mexico, now used during part of the year as stock range. If irrigation were possible many of the desert areas throughout the West could be converted into fertile agricultural land. Water, rather than soil, is frequently the decisive factor in determining whether cultivation is practicable.

means to this region is also well illustrated by the value of the crops produced on irrigated lands that without water would be of little or no agricultural value. In 1915, 25,750 acres devoted to citrus fruits, alfalfa, and sugar beets, deriving their irrigation water from the San Antonio watershed, with an area of only 24 square miles, yielded crops valued at \$5,400,000; while 5,870 acres of citrus fruits, deriving their water from the San Dimas watershed, with an area of only 18 square miles, yielded crops valued at \$2,600,000.

Irrigation represents one of the vital needs for water in the West, but there are others. Water is the "white coal" which furnishes or will furnish the motive power for lighting systems, trolley lines, and manufacturing plants everywhere in the Western states. As such it constitutes an immensely valuable resource. The western mountains contain more than 72 per cent of the potential water power of the United States. Through lack of markets, only a comparatively small part of this has been utilized, but in the last 20 years great strides have been made in development. In the decade from 1902 to 1912, for example, water-power development in the Western states increased 451 per cent, or more than four times as rapidly as in the rest of the country. How rapidly water power is developed in the future will depend solely on how many new industries and people make their home in the West. Judging by how many have gone there in the past, the demands of the Western states upon their "white coal" will continue to multiply.

No less than forty-two per cent of the water power resources of the eleven Western states, or approximately 31 per cent of the water-power resources of the entire country, is actually within the National Forests. Moreover, a large part of the remaining power, although developed outside of the Forests, is derived



WHERE "WHITE COAL" IS TRANSFORMED INTO ELECTRICITY

A power plant on the Sierra National Forest, California. The pipe line has a drop of 2,000 feet. The National Forest contains 42 per cent of the water power resources of the West. These can be developed by private interests upon payment of an annual charge and under restrictions that protect the public against monopoly.

from streams rising in them. In 1915 nearly 42 per cent of the water power already installed was developed by plants some part of which occupied National Forest lands or which were directly dependent on storage reservoirs constructed on National Forest lands, and 13.6 per cent more was similarly dependent on other public

lands. Even these figures, however, do not bring out the full significance of the National Forests in their relation to the water-power resources of the West. A large part of these resources outside of the Forests are so located as to be extremely difficult of development under present conditions, and so a continually increasing proportion of new water-power developments is utilizing sites within National Forests or other public lands.

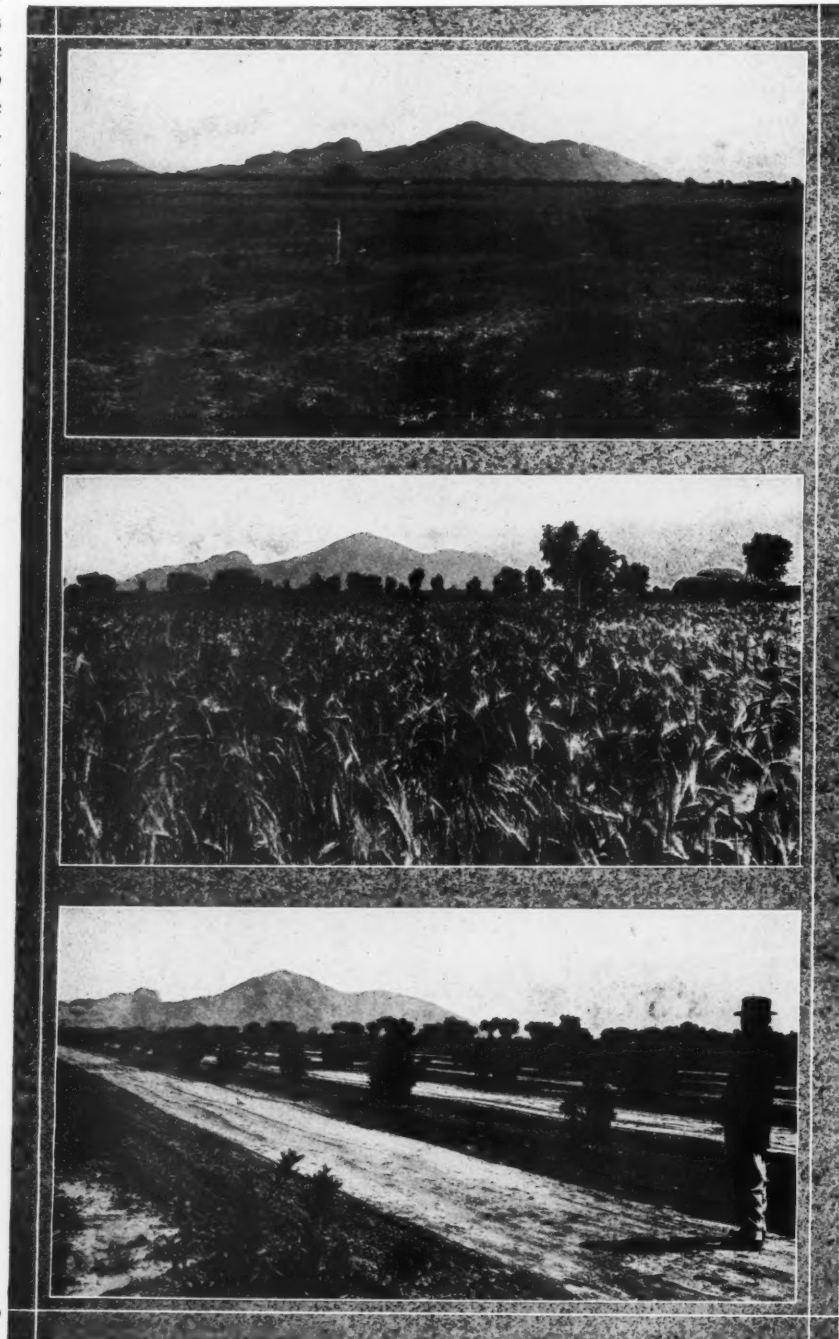
Farther downstream, in the lower reaches of the rivers and in the harbors into which they flow, water contributes still further to western prosperity. Inland water transportation in the Mountain and Pacific states will never attain the development of which it is capable in the Eastern and Central states but it is already of considerable importance, and should become increasingly so as the population grows denser and traffic cor-

respondingly heavier. According to the 1916 report of the Chief of Engineers, United States Army, there were at that time some 26 navigable streams in the Western

States, with a navigable length of approximately 1,746 miles and an annual movement of over 14,000,000 tons valued at more than \$250,000,000. The relation of the

National Forests to navigation is not strikingly obvious, since practically all the navigable portions of western streams lie outside of the Forest boundaries. Yet by far the greater part of the water that they carry originates in their upper courses, which are to a large extent included within the National Forests. Any influence that the Forests may exert on this water is therefore felt indirectly, but none the less surely, by the streams and by the harbors into which they flow.

Ordinary drinking water may lack the romantic associations of some other beverages, but it nevertheless is an everyday necessity for thousands of families scattered on farms and ranches and in numerous small settlements throughout the



BEFORE AND AFTER

Upper.—A portion of the Salt River Reclamation Project in southern Arizona previous to irrigation, covered only with a sparse growth of desert vegetation.
Center.—The same area after water has been applied, covered with a vigorous crop of barley.
Lower.—The same area several later, covered with a thrifty young orange grove.

West and for the still larger population comprised in the towns and cities. How much effort and money must be expended by western cities in obtaining a pure and

abundant water supply is shown by the examples of Los Angeles and San Francisco, the first of which has considered it worth while to spend some \$25,000,000 to bring water from Owens Valley on the east side of the Sierras across 250 miles of desolate and rugged country; while San Francisco is going back 190 miles into the fastnesses of the Sierras at an estimated cost of \$77,000,000 in order to get its supply from the famous valley of the Hetch Hetchy.

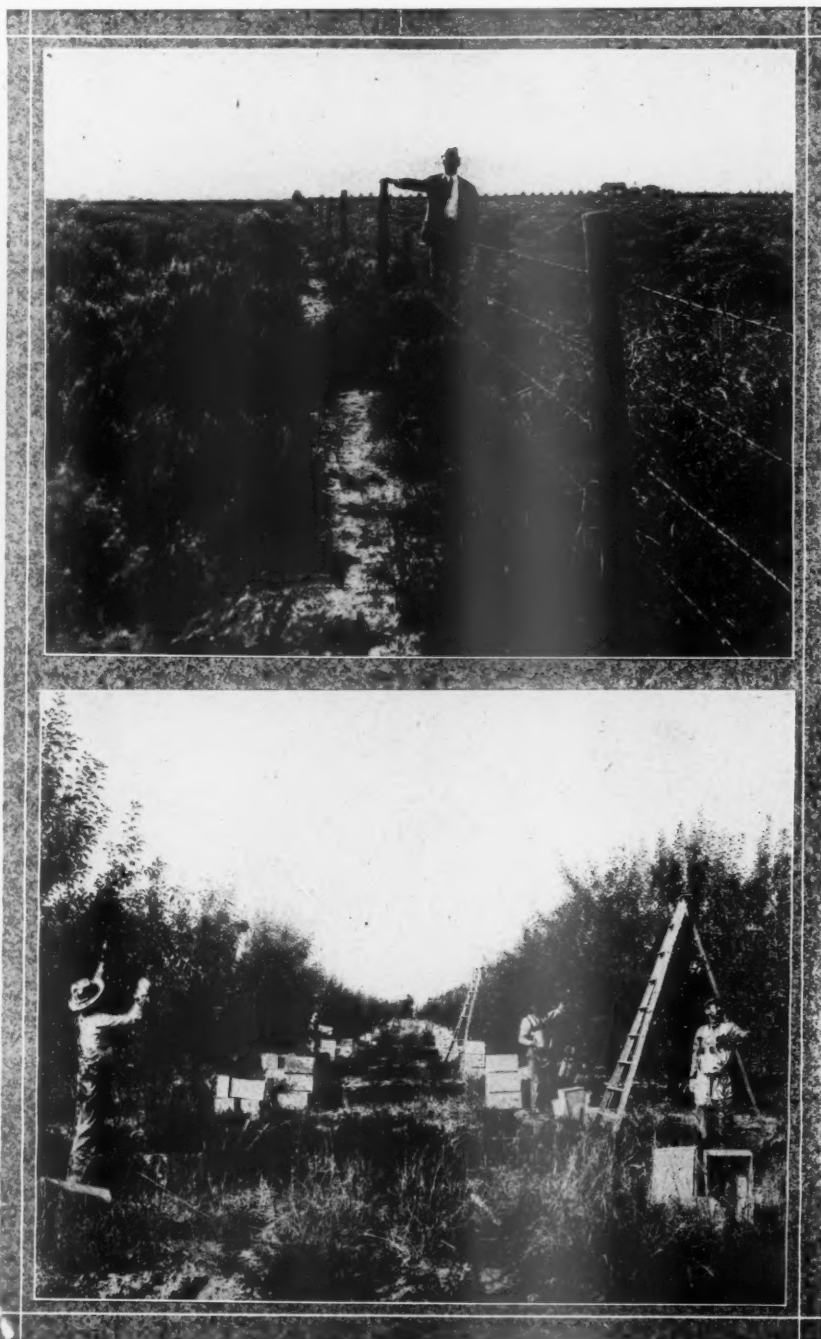
Some 732 western towns and cities, with an aggregate population of 2,265,000, depend on the National Forests for their domestic water supply. This does not include, of course, ranches and small settlements equally dependent on the Forests, nor the towns and cities securing their domestic water from streams and underground supplies which are at some distance from the Forests, but which rise from sources within

them. Denver, Colorado; Salt Lake City, Utah; Los Angeles, California, and Portland, Oregon, are conspicuous examples of large cities which are insured a pure

and abundant water supply by the National Forests. So important is this function of the Forests that many communities have entered into co-operative agreements with the Forest Service for the better protection of the watersheds from which they get their supplies.

Perhaps the most obvious relation that exists between forests and water is the tendency of the tree cover to check erosion. The leaves and branches of the trees prevent the rain from beating upon the soil as it does in the open; the cover which they afford delays the melting of snow in the spring; the upper layers of the forest soil act as an enormous sponge that absorbs large quantities of water which in turn are passed on to the great reservoir of mineral soil beneath; and finally, the surface cover of stumps, fallen twigs, branches, and even whole trees acts as a mechanical obstruction to prevent rapid run-off. The

surface run-off from forest areas is less both in total amount and in velocity, than that from similarly situated unforested areas. The steeper and more rug-



THE DESERT BLOOMS

Upper.—With and without—a striking illustration of the transformation worked by the application of water. The dry land outside of the fence on the Minidoka Reclamation Project is a sagebrush desert; that inside, a fertile field of alfalfa.

Lower.—An apple orchard on the Boise Project of the Reclamation Service in Western Idaho on land formerly covered with sagebrush.

surface run-off from forest areas is less both in total amount and in velocity, than that from similarly situated unforested areas. The steeper and more rug-

ged the topography, the more marked is this contrast.

In hilly country some erosion is, of course, inevitable under any conditions. When the soil cover of trees, underbrush, and litter is kept intact, however, this is more often beneficial than otherwise, since only the lighter soil particles are washed away, to be later deposited in the more level lands below, adding to their fertility. But when this protective cover is interfered with, whether by fire, destructive lumbering, overgrazing, or injudicious clearing of land for agriculture, the proportion of coarser, infertile materials washed away increases greatly and transforms erosion from a constructive into a dangerously destructive force, difficult of control and capable of doing untold damage.

From the standpoint of the water user, the tendency of the mountain forests to prevent erosion is of the utmost importance. Wherever stor-

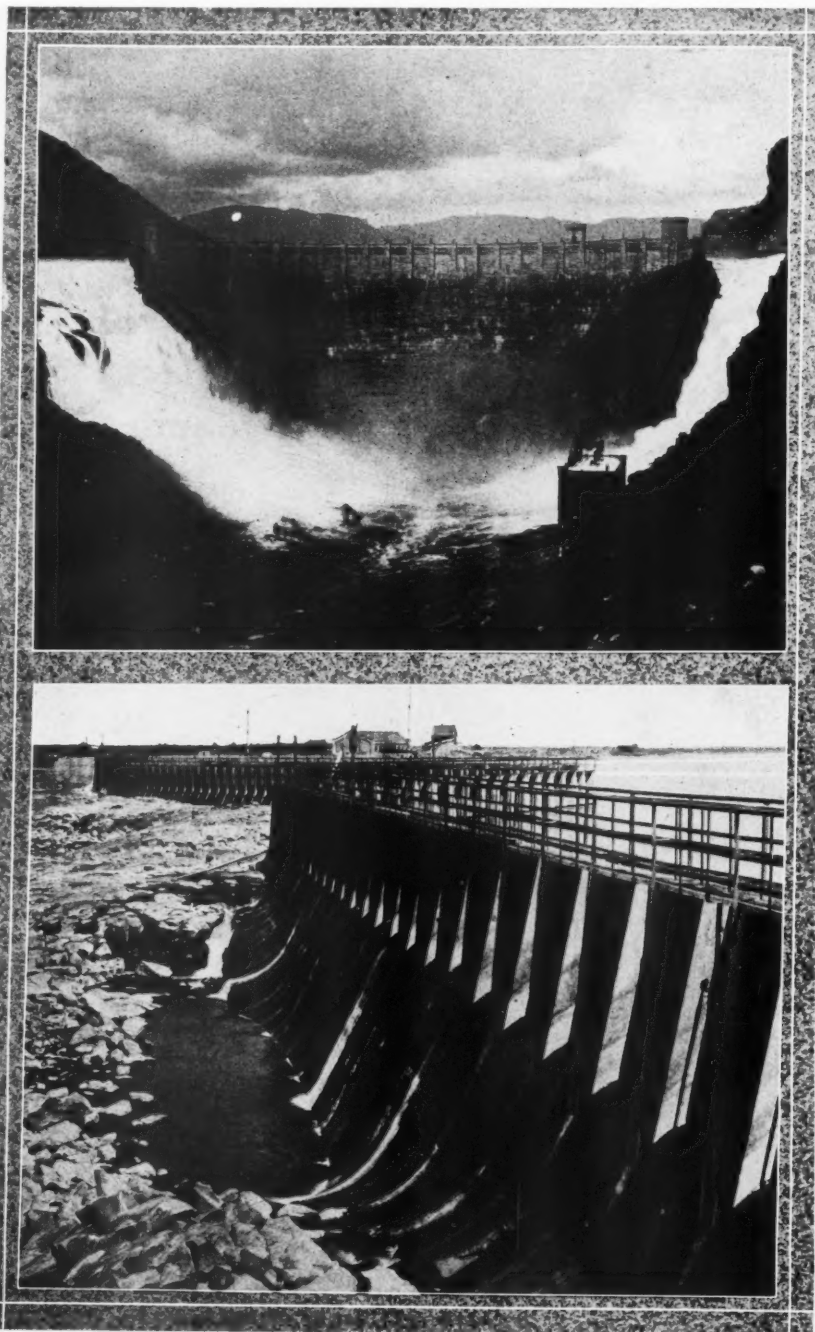
age reservoirs must be used, whether for municipal supplies, irrigation, or water power, they are exposed to the ever-present danger of silting up. Every bit of soil

brought down by the streams and deposited in them reduces their capacity and consequently their effectiveness by just so much. This sedimentation is serious

under any condition, but doubly so when, as not infrequently happens, no other satisfactory dam sites are available and the reservoir can not be replaced at a reasonable cost.

Water heavily laden with eroded material often decreases the efficiency and increases the cost of maintaining diversion dams, pipe lines, flumes, canals, and other irrigation works. Sometimes such water damages the crops to which it is applied, and not infrequently it seriously injures or even ruins the land by burying it under a mass of sand, gravel, boulders, and other infertile debris. Excessive erosion may interfere seriously with navigation by filling the streams with material which is deposited in their lower reaches and in

the harbors into which they empty. The action of the forest in reducing surface run-off tends also to regulate the flow of streams. Instead of rushing away in uncon-



WATER FOR IRRIGATION AND POWER

Upper.—Roosevelt Dam and power plant (in right center foreground). This reservoir stores 1,140,000 acre-feet of water and, together with the Verde River, furnishes the water supply for the Salt River Reclamation Project in southern Arizona. The bulk of the water for the project originates on the Tonto National Forest and the White River Indian Reservation.

Lower.—Minidoka Dam and power plant. This dam supplies water for the irrigation of 120,300 acres on the Minidoka Reclamation Project in southern Idaho. The electricity developed at the power plant is used on many farms for lighting, heating, and cooking.

rollable torrents the water is absorbed into the great reservoir of mineral soil, from which it is gradually paid out to the springs and streams. This tends to decrease the high water run-off and to increase the low water run-off. Both results are good. The decrease in the high water run-off means that there is less danger of destructive floods and less waste of valuable water; while the increase in low water run-off means that a larger supply of water is available during the dry season, when it is particularly needed. It is the low water flow that to a great extent determines the availability of any given supply for municipal use, irrigation, or hydroelectric development, and anything which will increase this flow is therefore a factor of prime importance.

What One National Forest Does.

A typical example of the ways in which the National Forests benefit the water user is furnished by

the Pike National Forest in Colorado. This Forest extends along the main range of the Rocky Mountains from somewhat north of Denver to south of Colorado

Springs, and includes within its boundaries a considerable portion of the headwaters of the South Platte and Arkansas Rivers. Irrigation by means of water coming

from the mountains included in the Pike National Forest had its modest beginnings in 1860 along the South Platte River in South Park and also near Denver. Since then the area on which irrigation is practiced has grown steadily, until now it is estimated at some 400,000 acres, valued at about \$40,000,000 and with an annual crop production of over \$10,000,000. On many acres where water is not available dry farming is practiced, but the results are uncertain and the yields much less than on irrigated land. The value of water in this region is so great that the natural flow of the streams is greatly over-appropriated, and there is need for every additional drop that can be developed or stored. Practically all of the Great



IRRIGATION RESERVOIRS ON THE NATIONAL FORESTS

Upper—Lake Keechelus on the Wenatchee National Forest, Washington, used as one of the storage reservoirs for the Yakima Reclamation Project. When completed, this project will include more than 146,000 acres of irrigated land. The crop production in 1915, on about two-thirds of the area ultimately irrigable, was valued at \$2,400,000.

Center—Granby Lakes on the Battlement National Forest, Colorado. This Forest was created in 1892 at the request of local residents to protect their supply of water for irrigation and domestic use. Within its boundaries are now some 400 reservoirs supplying about 140,000 acres of irrigated land valued at more than \$2,500,000.

Lower—Jackson Lake on the Teton National Forest, Wyoming, with the Teton Mountains in the background. This forms one of the main storage reservoirs for the Minidoka Reclamation Project.

Plains lying east of the Rocky Mountains is potentially agricultural land, and the only limit to its development is the amount of water which can be secured for irriga-

tion. So well recognized is the part played by the forest cover in protecting the water supply that in one case an organization of farmers has protested

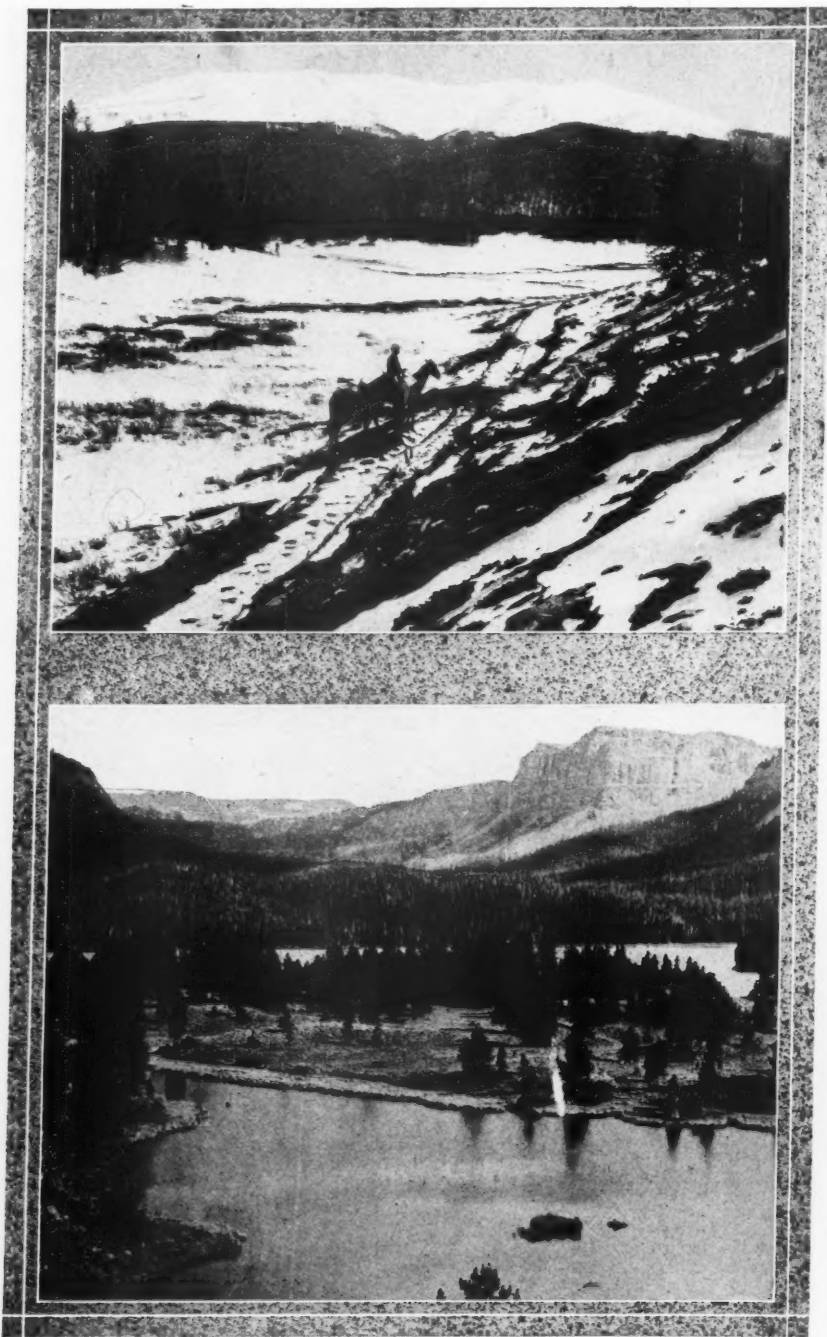
reservoir, Lake Cheesman, with a capacity of about 26,000,000,000 gallons and a watershed of 1,152,000 acres, in the heart of the Pike Forest. Colorado Springs has a

series of reservoirs which also get their supply from the Pike. Altogether, some 35 cities and towns with an aggregate population of 275,000, and an investment in waterworks of over \$17,600,000, obtain their domestic supply from this Forest. The watersheds supplying Denver, Colorado Springs, Manitou, Cascade, and Idaho Springs are given special protection against fire. At the request of local residents, Congress has added nearly 28,000 acres to the Pike Forest, while farther north, on the Colorado National Forest, Congress in 1916 authorized the addition of some 540,000 acres for the purpose of watershed protection.

Where fire has destroyed the forest cover on certain of the watersheds within the Pike, young trees are being planted. Already some 3,000 acres have been planted by the Forest Service on the watersheds denuded by the great fire of 1866, from which Colorado Springs and its suburbs obtain their water, and plans have been perfected for the reforestation of an additional 9,000 acres.

The development of hydroelectric power bids fair to constitute another important use of the streams which take their rise in the Pike National Forest. It is only in recent years that water in this region has been utilized for power, but the possibilities for development offered by the streams are tremendous.

Placer mining, which, aside from drinking and bathing, probably called for the first use of water on the Pike National Forest, is now practically a thing of the past. The use of water in the milling of ores, however, is quite common in a number of districts, and there are many mills which could not operate without an abundant and constant supply. The value of water as a scenic, or esthetic asset, and its contribution to recreation in the



HOW THE NATIONAL FORESTS PROTECT RIVER SOURCES

Upper.—Willow Creek, one of the sources of the Colorado River, in the Arapaho National Forest, Colorado. The stream comes gently from the belt of forest which stores melting snow from above timber line on the Parkview Peaks.
Lower.—Trapper's Lake, also on the headwaters of the Colorado River, in the White River National Forest, Colorado. The dense stands of timber which are characteristic of such situations help to prevent erosion and irregular run-off.

against any cutting of timber on certain watersheds. No less important is the use of the water for domestic and municipal purposes. Denver has its main storage

region, should also not be overlooked. To the Pikes Peake region come thousands of visitors every year, attracted by the scenery and climate. Periodically dry streams and eroded stream beds are far from attractive, and in helping to prevent erosion and to maintain a steady stream flow the forest adds materially to the value of the region for the tourist and pleasure seeker.

Some Results of Forest Destruction.

How any interference with the protective cover of trees and other vegetation works to the detriment of the water user is illustrated by the history of a small stream on the Pike Forest known as Trail Creek. This was originally a clear stream confined to a narrow channel and with comparatively little erosion. Gradually, however, the character of the stream changed as a result of heavy cutting on its watershed, prior to the creation of the National Forest and on private lands included within the Forest boundaries, followed by a number of severe forest fires. Floods became more frequent, erosion set in, the stream beds were widened, and their bottoms began to fill up with sand and gravel washed down from above.

In April, 1914, a heavy flood occurred which wrought serious damage to a small ranch at the mouth of the creek. Approximately 11 acres of irrigated land worth \$40 an acre and including nearly a fourth of the irrigated land on the ranch, were buried under from 18 to 30 inches of coarse gravel and rendered practically worthless. Furthermore, the flood filled up the irrigating ditches so completely and changed the course of Trail Creek so markedly as to make it impossible to continue the use of water from the creek for irrigation without going to considerable expense in the construction of new improvements. In August of the next year a heavy hailstorm resulted in another flood which washed out several acres of hay land along the creek bottom and ruined 16 tons or more of hay worth \$14 a ton. The

same storm also brought down an immense amount of gravel in an ordinary dry gulch running through the farm and piled this 2½ feet deep against the kitchen



EVERYWHERE THE NATIONAL FORESTS AND THE MOUNTAINS COINCIDE

Upper.—Headwaters of Lewis River in the Rainier National Forest, Washington, with Council Lake in foreground and Mount Adams in background.
Lower.—Typical view of the Cascade Mountains in the Columbia National Forest, Washington, with Mount St. Helens in background.

door. Altogether, the floods of these two years damaged this one small ranch to the extent of at least \$600 and rendered approximately one-fourth of it practically non-

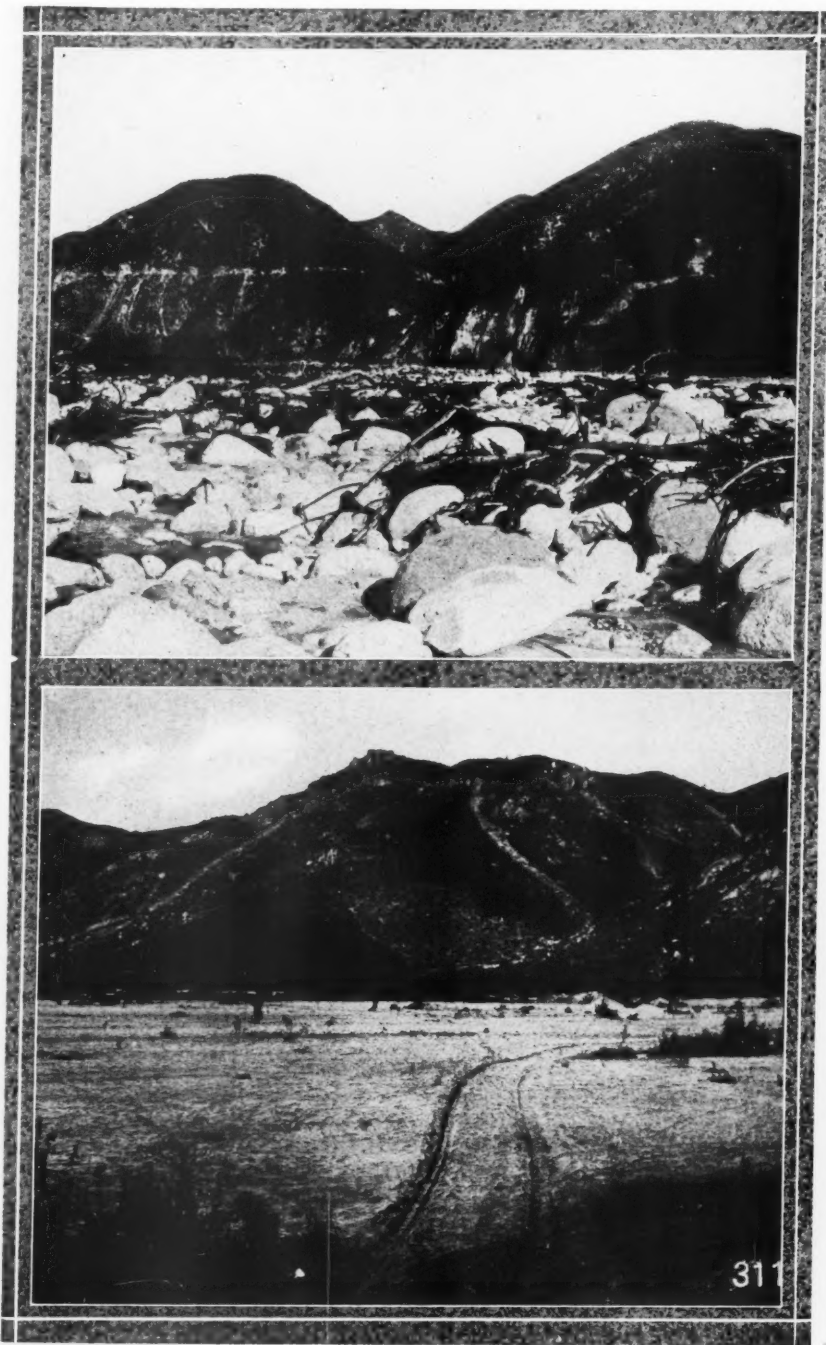
productive. Other examples of the damage resulting from interference with the forest cover before the creation of the National Forests can be selected almost at random from the Mountain Forests of the West. In the Sangre de Cristo Range and the Greenhorn Range, in what is now the San Isabel National Forest, in southern Colorado, it is very noticeable that streams whose headwaters have been denuded to a considerable extent of their protective cover have badly eroded channels and are subject to great extremes in flow, with frequent destructive floods, while no harmful effects of this sort are noticeable on streams whose headwaters are well timbered. Wild Cherry Creek, for example, after being almost completely burnt over, was subject to spring floods and to damage from erosion. During July it would dry up at a distance of not over 2 miles from the mouth of the canyon. As the watershed has become reforested these conditions have changed gradually until today the stream is not subject to floods and erosion and is more regular in its flow.

During the summer it now reaches a point 4 miles below the mouth of the canyon and is used early in the fall for irrigation. Apache Creek, which formerly flowed

the full length of its course all summer, since the destruction of the timber at its headwaters disappears only 2 or 3 miles from its head; and its only value for irrigation purposes after the middle of June lies in its flood waters, which are very uncertain. Hardscrabble and Medano Creeks have suffered similar results, and the list might be extended almost indefinitely.

On the North Fork of the Gunnison River, in western Colorado, much flood damage has occurred as a result of the extensive fires which burned over its upper watersheds in the late seventies and early eighties. Previous to that time the creek channels were narrow and rocky, beavers were abundant, and the bottom lands showed little erosion.

In 1884 a heavy snowfall was followed by a flood which is estimated to have ruined at least 2,000 acres of good ranch land. Since then destructive floods have occurred every



WHAT TOO RAPID RUN-OFF CAN DO

Upper.—Boulders for soil. This view of the Santa Ana River in southern California shows how torrential run-off may wash away the soil and leave the land covered with snags, gravel, boulders, and other infertile debris.

Lower.—Sand for alfalfa. The sand waste in the foreground is typical of hundreds of acres of formerly good alfalfa land along the San Diego River in southern California which were seriously damaged by the flood of January, 1916.

few years. In 1912 irrigated land and other property was damaged to the extent of some \$20,000, a \$5,000 bridge was washed out, and \$8,000 was expended in preventing the destruction of two other bridges. In spite of this comparatively recent damage it is generally believed that floods are becoming less frequent and less destructive as adequate fire protection on the Gunnison Forest is gradually restoring a forest cover on the burned-over areas.

Thirty years ago a big fire burned over the watershed of Gypsum Creek, which is located in central Colorado in what is now the Holy Cross National Forest. Two years after this fire the low water flow of the creek was so reduced that the use of water for irrigation from it was restricted to the first 47 decrees. Since then the flow had gradually increased with the establishment of a dense stand of timber until now it furnishes sufficient water for 130 decrees.

The following letter from a rancher in northern Wyoming throws light on what the protection afforded by the Bighorn Forest means to the water user in that part of the country: "I

have resided on Rock Creek for 28 years. During all this time I was owner of a ranch and was dependent on a good supply of water for all my crops; the welfare of

my stock and my own financial standing depended, therefore, more or less, on a good flow of water in Rock Creek. All these reasons make a man observant and thoughtful about any causes that may prevent a normal flow of water in any stream the headwaters of which are in the mountains. We all know that if a forest fire runs through the biggest portion of the watershed of a stream the water supply of such a stream is greatly diminished, if not entirely cut off, during the latter part of July and August, and untold damage is done to all ranchmen who are dependent on such a burned-off area for their irrigation water.

"As proof of the foregoing, I mention the great fire on the headwaters of Rock Creek

in 1890, when four-fifths of the Rock Creek watershed was burned off. There was good reason to think it was incendiarism. Immediately after the fire and for eight



THE FIRE MENACE

Upper.—Vista Point, on the Santa Fe National Forest, at the headwaters of the Pecos River. Dense stands of timber are typical of the higher elevations, where fire has been kept out, and form an ideal cover for the watersheds.

Lower.—View on the Rainier National Forest, Washington, along Stabler Ridge and Niggerhead. Where fires have burned we have denuded slopes like this, which are a menace to the lands below because of the danger of erosion and floods.

years afterwards there was very little water at the right time. There were some destructive floods too early in the season to do the irrigator much good. But as the hills became covered with young reproduction the flow of Rock Creek kept increasing and the floods became less destructive, and today, 20 years after the fire, Rock Creek is nearly normal again, but not quite, for the reason that in the head of the main fork the fire was so destructive that there were no seed trees left for a distance of nearly 5 miles on the south side of the creek, and consequently the reproduction is very scattering.

"In conclusion I wish to state that anyone who successfully farms a ranch in this part of Wyoming understands the great importance of keeping the forest fires out of the mountains and of maintaining a good stand of timber on the watersheds of all streams to hold the snow and help prevent the rapid run-off of the water too early in the season to be of much use to the irrigator."

Many examples of destructive floods caused by over-

grazing in the mountains prior to the creation of the National Forests are furnished by the State of Utah. In what is now the Fillmore National Forest the Chalk

Creek, Pine Creek, Meadow Creek, Fool Creek, Oak Creek, and Scipio watersheds, which supply the water for 27,000 acres of irrigated land and for the towns of Fillmore, Meadow, Oak City, and Scipio, were at one time so heavily overgrazed that the resulting floods damaged roads, reservoirs, cultivated land, and other property to the extent of thousands of dollars. Since the creation of the National Forest grazing on these watersheds has been prohibited or restricted, and the vegetative cover has had a chance to re-establish itself. As a result, the floods have been steadily decreasing, both in number and severity, until they are now practically negligible. The importance of the protection exercised by this Forest is still further



PROTECTION OF DOMESTIC WATER SUPPLIES

Upper.—Intake of the water system for the city of Portland, Oregon. Water for the city comes from the Bull Run Watershed, entirely within and protected by the Oregon National Forest.
Center.—Lake Cheesman, in the heart of the Pike National Forest, Colorado—the main reservoir for the water supply system for the city of Denver.
Lower.—A street drinking fountain in Portland, Oregon. The purity and abundance of the water is assured by the fact that it comes directly from the Oregon National Forest.

emphasized by the fact that, together with the Fishlake and Sevier National Forests, it is the source of water used in the irrigation of some 200,000 acres, valued at

over \$18,000,000, and as the domestic supply for some 28 towns, with a total population of about 13,000. *How National Forest Administration Benefits the Water User.*

In the actual management of the National Forests every precaution is taken to see that the interests of the water user are fully protected. No utilization of their various resources is permitted unless a negative answer can be given to the question, Will the proposed use have any injurious effect on the water supply?

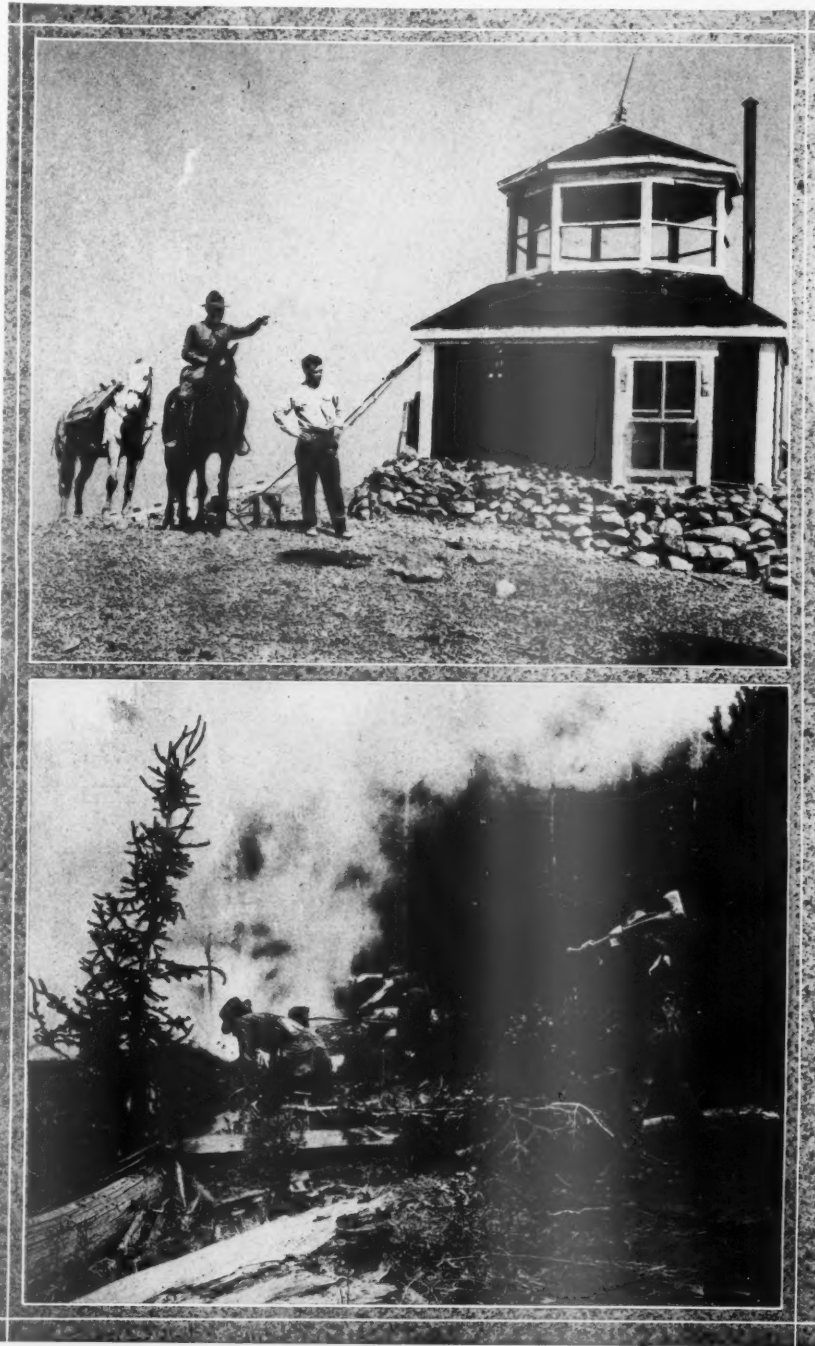
An outstanding feature of National Forest administration is the emphasis placed on fire protection. Fire is the worst thing that can happen in a forest, both as regards destruction of property and interference with the water supply. Every fire, no matter how small, destroys some of the organic material in the surface layers of the soil, and to that extent reduces its absorptive capacity. Repeated fires on the same area, even if they do not destroy the forest outright, may practically nullify its effects in preventing erosion and regulating stream flow. Every effort is made

to control so dangerous a menace. The guiding idea is to prevent fires from starting and to put out those that do start before they attain any considerable head-

way. Various means are used to bring home to the general public the seriousness of the fire danger and to secure the co-operation both of local residents and transient visitors. Lookout stations are established on mountain tops and at other points of vantage for the prompt detection of fires. These are supplemented by riding patrols. Boxes of fire-fighting tools are placed at strategic points. Roads, trails, and telephone lines are built as means of quick communication. Extra men to serve as fire guards are appointed during the danger season, and the local community is so organized as to make an efficient fire-fighting force available on short notice.

The system has now reached a stage of efficiency where the majority of fires are

brought under control before they do any serious damage. In 1916, for example, 73 per cent of the 5,655 fires on the National Forests were extinguished before they had



FIRE PROTECTION ON THE NATIONAL FORESTS

Upper.—A fire-lookout station on the summit of Mount Eddy, on the Shasta National Forest, California. Lookout stations of this sort make possible the prompt detection of forest fires. They are connected by telephone with the headquarters of the Forest Supervisor, who is thus enabled to organize and dispatch a fire-fighting crew before the fire gains any considerable headway.

Lower.—Extinguishing a fire on the Wasatch National Forest, Utah. In the mountains of the West axes and shovels play a much more important part than water in the suppression of forest fires.



PLANTING TREES ON DENUED LANDS

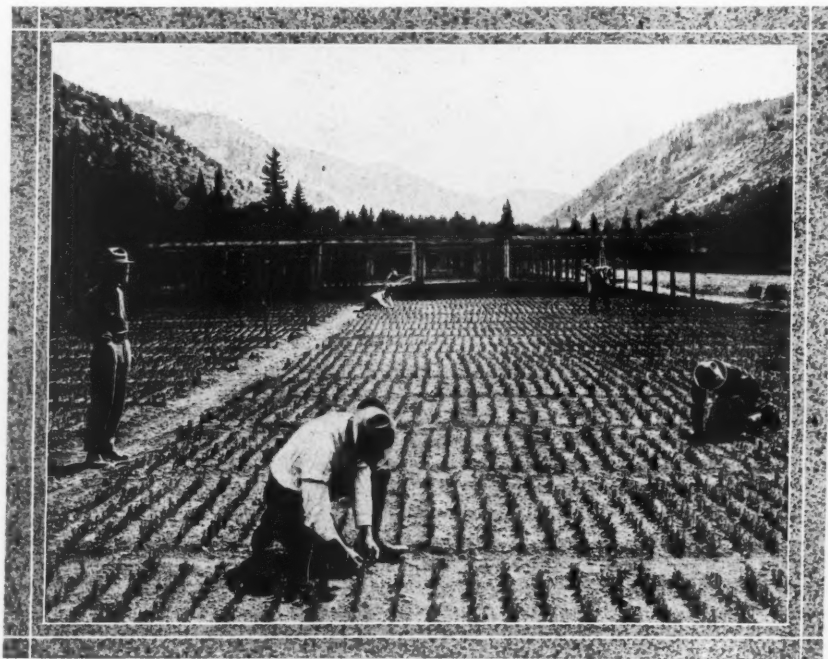
Transplant beds at the Cottonwood Nursery on the Wasatch National Forest in Utah. About 10,000,000 forest tree seedlings and transplants are grown by the Forest Service each year for use in the reforestation of denuded lands on the National Forests.

burned over 10 acres, and only 4.4 per cent caused a damage of more than \$100. The chief opportunities for further progress lie in reducing the number of fires that occur, and in this work every citizen can help. The water user in particular should be among the very first to cooperate in keeping down fires. His prosperity is intimately bound up with their suppression.

Necessary precautions are likewise taken to keep in check insects and diseases which would endanger the forest cover on watersheds in the National Forests.

When the boundaries of the National Forests were first drawn it was inevitable that occasional areas of land more suitable for farming than for timber production or watershed protection should have been included. To make certain that all of the lands within the National Forests will be put to their best use thorough surveys were made by experts, as a result of which the lands have been classified according to their primary value for timber production, watershed protection, agriculture, and the like. In making this classification, one fundamental prin-

ciple was followed, namely, that land chiefly valuable for the prevention of erosion or the regulation of stream flow should be retained in the National Forests and administered primarily for these purposes. Such other lands as appear to be more valuable for crop production have either been eliminated altogether from the National Forests or else opened to entry under the Forest Homestead Act. It sometimes happened that areas were encountered which were of value both for farming and for watershed protection. When this was the case it became necessary to determine their relative value for the two purposes. The fact that throughout the West water is such a precious commodity ordinarily led to the classification of such tracts as primarily valuable for watershed protection. A good example of the way in



TREE PLANTING ON THE PIKE NATIONAL FOREST, COLORADO

This is the watershed from which Colorado Springs derives its domestic water supply. About 10,000 acres are reforested each year by the Forest Service, mainly on watersheds from which towns and cities and irrigation projects derive their water supply.

which this works out in actual practice is afforded by the Angeles National Forest in southern California, which is the main source of the water supply for millions of dollars' worth of citrus groves and other irrigated lands in the valleys below. These lands, which owe their high

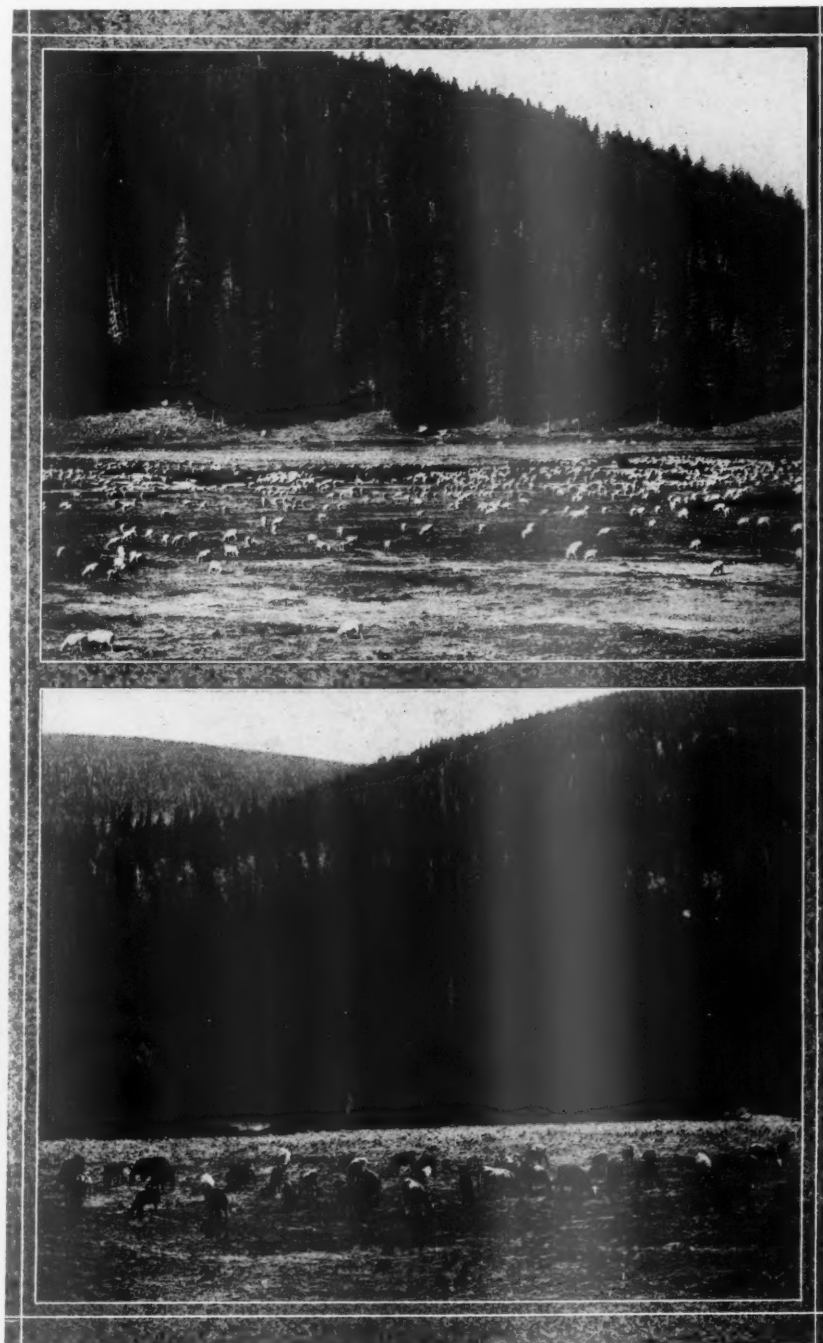
productiveness entirely to irrigation, are many times more valuable than the rather mediocre lands within the National Forest, even when the latter can be cultivated successfully. Consequently, all of the land within this National Forest, much of which is easily eroded, has been classified as primarily valuable for watershed protection wherever there was any danger that its cultivation might cause erosion or changes in stream flow that would result in damage to the irrigated lands below.

The same principle also applies in the case of lands primarily valuable for municipal supply or for hydroelectric projects. Out of the 12,000,000 acres of land in the Western States that have been eliminated from the National Forests or opened to entry in the last five years, practically none are primarily valuable for watershed protection. The water user and his needs have been given first consideration. Within the National Forests is a large part of the western summer stock range. Before the creation of the Forests, this range had been so badly

trampled and so heavily over-grazed that its carrying capacity had been seriously decreased, and, what was worse from the standpoint of the water user, the protec-

tive influence of the surface cover of grass, shrubs, and small trees had been largely destroyed. In many localities over-grazing had been the cause of severe erosion, disastrous floods, and reduced stream flow during the dry season.

Grazing in the National Forests has been regulated in such a way as to repair such damage to the fullest possible extent and to prevent similar damage on areas not already affected. Not only has grazing been restricted in certain localities, but new methods of handling the stock have been introduced. In the case of sheep, for example, the old method of grazing them in large, compact bodies and bringing them back night after night to the same bedding ground, which proved so in-



REGULATED GRAZING ON THE NATIONAL FORESTS

Upper.—Sheep grazing on the Santa Fe National Forest, New Mexico. Approximately 7,500,000 sheep use the National Forest range each year. Damage to the vegetative cover is prevented by limiting the number of stock to the carrying capacity of the range and by proper methods of handling, such as open herding, illustrated in the picture.

Lower.—Cattle grazing on the Santa Fe National Forest, New Mexico. Approximately 2,000,000 cattle and horses use the National Forest Range each year. Full utilization of the range is secured by the proper development of water holes and salting grounds.

jurious to both forage and soil, has been replaced by handling them in smaller, more open bands and by bedding them down wherever night overtakes them. Cattle

are prevented from congregating too much by a proper distribution of salt and the development of watering places at the higher elevations and on the less frequented parts of the range. All stock is kept off of the range until the ground is firm enough not to be cut up by trampling. Where necessary, no grazing is allowed until the grass and other herbs have had a chance to seed. By such measures as these the water user is protected, and at the same time the grazing industry is benefited. Under the improved methods the range is, in fact, being built up to a point where it can carry larger numbers of stock than before and still afford protection from the twin dangers of erosion and irregular stream flow.

In cutting timber on the National Forests, similar precautions are taken to see that the interests of the water user are properly protected. Destructive lumbering, which too often stripped the land and abandoned it to fire, with entire disregard not only of the future timber supply, but also of the water supply, is now a

thing of the past, so far as the National Forests are concerned. In its place has been substituted a system of management which assures the preservation of the forest

cover and of its protective influence. At the higher elevations, where because of thin soil, steep slopes, and heavy precipitation the preservation of a fairly dense forest cover is particularly important, "protection forests" may be set aside in which little or no cutting is allowed. At lower elevations the amount of cutting that may safely be allowed naturally varies more or less with local conditions. In each case a careful study of the situation is made, and the timber is never thinned below the point of safety. Lumbering is carried on with the primary object of improving the forest and keeping it continuously productive. So far as possible, new growth is secured by natural reproduction from the



ONE METHOD OF STREAM CONTROL

A costly substitute for brush and forest cover. These check dams are part of a series of approximately 400 dams constructed in Haines Canyon, on the Angeles National Forest in Southern California, at a cost of some \$6,000,000, in order to control the floods resulting from the complete burning off of the protective brush cover.

old trees left standing. Areas burned over before the creation of the National Forests need to be planted to trees and many difficulties are encountered in this work.

TRAVELS OF AN ENGLISH CHRISTMAS TREE

BY CLARA L. WEST

IT was the day before Christmas in England—in the south of England, where the belated roses lingered here and there in the gardens, and the snow melted as soon as it fell.

The family at the Hall, an old country seat, decided that it was time to bring in the tree. Now the trees on an English estate are considered very valuable. The "lop and the crop" of the trees are used for kindling, that is; the cuttings made by the woodmen, and the small branches which fall of themselves. But to cut down a tree—that is a matter requiring the greatest consideration. So, it was quite an event to go into the woodlands, with the Lord of the Manor, who had the right to cut down, or dig up, any tree he pleased.

The Squire, the guests, the children of the whole place, even some of the house servants, went with the gardener and the woodmen in search of the Christmas tree.

It was a fit tree they wanted—not too large, nor too small. When they came to a fine strong tree, they stopped, and all made a circle around it.

"Shall you chop it down now?" asked the American, one of the guests.

"Chop it down!" exclaimed the Lord of the Manor.

"Chop it down!" echoed the gardener, in great surprise.

"Chop it down!" cried the children.

They were all thinking of it as a live greenwood tree—but the American only thought of it as a framework to be dressed as a Christmas tree.

"No—we shall dig it up," said the squire;

"Yes—dig it up"—agreed the gardener;

"Dig it up"—repeated the children.

While the American wondered what difference that would make. But, that was all the difference in the world, as you shall see, for it saved the life of the tree.

The gardener measured the earth from the trunk of the tree to the circumference of a circle around it, staking it off with bits of wood, working just as if he were going to transplant it. Then the woodmen dug it up, roots and earth, and planted it in a great tub, like a washtub, which really looked like a giant's flowerpot. After that the tree was hoisted into the cart driven out of the forest, across the park, to the house. There they placed the noble fir tree in the middle of the great entrance hall. And this was the tree's first journey into a world outside of the green-wood.

The Yule log was already in the great fireplace, ready to be lighted. Holly and mistletoe boughs garlanded the chimney-piece and the old portraits in the Hall. And on the wainscoting of the walls there were curiously carved panels, representing scenes from English history, and old customs. One of them was about the "Making of Pinnes." It represented a man

kneeling before Queen Elizabeth, with many quaint round-headed pins stuck in a cushion. The Queen looked in surprise at these wonderful things. Underneath was carved in old English letters:

"How ye makynge of pinnes was firste done in a righteous and discreet manner in Gloster Citee. For ungodlie men, seekynge only their present gain, fixed ye head without steadfastnesse, and fools, of their folie, made ye point with dust of Qud (?) that left it malign unto them that were wounded withal!

"Whereupon Elizabeth, our Queen, gave right of patent unto John Tilsby, our citizen, who avouched and shewed proofs that he made espingles (pins) with truth and knowynesse."

And so, it was this John Tilsby who was kneeling before the Queen showing her his good Gloucestershire pins. But no one paid much attention to the treasures in this old house—the carvings, portraits, and the wonderful porcelain collections, because the tree was waiting to be dressed. It was a real live tree, remember, with its good roots still feeding it.

Before dark the family came with hammers and tacks, and green branches, and they covered the tub, with evergreens and holly, until not an inch of the wood could be seen. After that, the red apples and oranges were tied on, to properly weight the branches—then the gilded and silvered walnuts, and many colored shining balls, paper butterflies, gold and silver birds and fishes, bon-bons, and Christmas boxes of candies (which they call "sweets" in England), and mysterious small packages for special people, tied up in gay papers. Then much glittering tinsel thread, called "Angels Hair," and paper posies. Then they put on some little glass bells, which made a cheerful tinkling sound whenever the tree was shaken. But no popcorn, because there is none in England, and no strings of red cranberries, for the same reason. The wax tapers were then put in place, red, blue, green, yellow, white and pink. And to crown it all, at the very top, they placed a big, dazzling, gold star, with many candles around it so that its shining could be plainly seen. All the large presents for the household were placed under the tree on the earth, covered with green. It was done! How fine it looked!

There the tree stood all night long, until the dawn. Very early the chimes of the village church began to ring in the Christmas morn. On and on they rang, for there were eight bells in the parish church tower, and it took nearly two hours to ring in all the changes.

The tree heard all this!

Presently a footman brought in a red bench—and placed it on one side of the hall. Then another, and another and another. They were red-cushioned benches and looked very gay. Then the man looked at the

clock, and went away to strike a gong. After the gong stopped sounding, there was a silence—a great stillness, in the house, for a time. Then the patter, patter, of footsteps coming down the great stairway announced the arrival of the family and their guests. "Merry Christmas" was heard on all sides. The master of the house pulled a bell, and the procession of house servants entered, headed by the housekeeper and butler, and took their places on the red benches. The family and friends were in groups near the fireplace and in the window niches. The lesson for the day was read, and the Christmas prayer said. And the Tree, in all its glory stood in the very middle of everything. Surely it had never been in such company before. And, afterwards when, amid much merry-making, the presents were given and taken, the tree had to part with some of its fine trimmings, while the little glass bells tinkled joyfully as each package was pulled off.

But hark! There were singers just outside the door:—

"Come fill the house with song and glee
With mistletoe and holly tree
For Christmastide is here."

There they stood, the children of the estate, with their fresh young faces, all dressed in their holiday clothes, singing the Christmas carol. When they had finished, they were called into the house, and each given a Christmas box.

The tree saw wonderful things that day: the carol singers, the bell-ringers, the finely dressed guests for the great dinner, the crackling Yule log, and all the fine presents spread around the hall.

The travels of the tree went on after Christmas day, for, the next morning many of the decorations were taken off, but not the glittering tinsel, the paper roses nor the great star. The cart came to the door, and took the tree down to the village school house. What a fine ride through the frosty air! The school children were to have a treat and the tree was again dressed. This time with many bags of candy and toys. All were tied so that the children could see them and talk about them. More wax candles—and some big round cakes with a hole in them through which the string to hang them on was tied. The children had a fine feast and a magic lantern show—then they sang a carol, and marched out passing the tree, each child getting a toy and a bag of candy and a cake. So, at the end of this evening the tree stood quite bare except for the tinsel, the paper posies, and the star.

One more journey the tree was to make before it re-

turned to its home in the forest, for it was going back to be planted again, and go on growing.

This last journey was to a hospital, in the Cathedral town. Once more the cart arrived and carried off the tree; and, as it rolled down the quaint old street, some children shouted "Ha! Look at the star—there goes a Christmas tree a-riding!" Again the traveling tree had to be dressed, and this time in a room where all the people were in little white beds trying to rejoice because it was Christmastide, although many were ill and sorrowful. The star shone out in all its splendor, and the fir-tree with its new decorations, stood up straight and strong, because its roots were firmly planted, and there was earth to nourish them. Nobody was afraid that the tree would fall over—it was not possible, with such a foundation, and besides it was alive!

Even Christmas festivals come to an end, and so, one morning the tree was made ready for its last ride in the cart. Then the glittering star came off, and the tinsel, and even the paper posies.

The children of the old estate eagerly watched the country road for the return of the tree. When it entered the park, the children, indeed everyone in the house, rushed down to meet it and go with it into the woods. And one of the children said. "Let us hang one of our glass bells on the tree and then it will tinkle when the wind blows." And so they did.

The gardener and the woodmen took the tree back to the very place from which they dug it up. There was the great yawning hole, and when the woodmen knocked off the staves of the tub, the tree was planted back into its old home, ready to go on growing when its roots should strike out again into the earth.

It was a proud tree, for it was not only a fir tree, but a Christmas tree, and a traveled tree, which had seen the life of creatures outside of the greenwood. When the wind arose the little Christmas bell tinkled as if to wish good cheer to all the birds of the woodland.

The children of the old place delighted to walk in the woods for they knew several trees which, from time to time, had been their Christmas trees in the Hall. Sometimes they would stop and exclaim "Look at this date," showing the metal tag with the date of the journey of the tree out of the forest.

And all this shows that it is better to have one live tree for three festivals, than to cut down, and kill, three trees for the same purpose.

This is a true story, and happens each year in a place in Southern England.

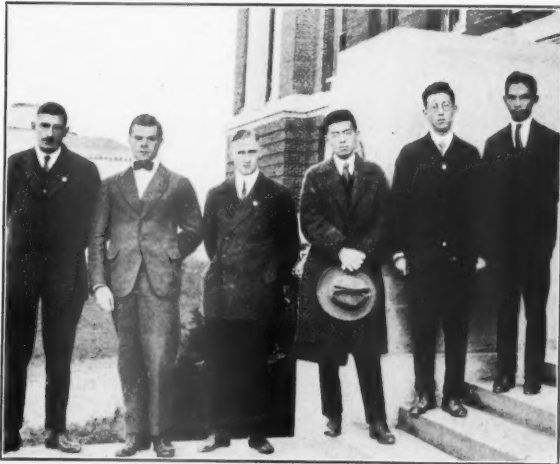
STATE FLOWERS OF MARYLAND AND WEST VIRGINIA

THE American Forestry Association has received a letter from Mrs. T. R. Payne, of Baltimore, Maryland, in which she says: "It gives the Halten Garden Club, of Baltimore County, great pleasure to announce that Maryland has a legalized state flower, the Black Eyed Susan (*Rudbeckia-hirta*). We thank you for your assistance in the matter and hope you will add

our state to your official list." And another from Mayo Tolmon, chief engineer, who says: In an article in the *Boston Transcript* I noticed you gave the state flower of West Virginia as the Indian Paint Brush. The state flower of West Virginia is the *Rhododendron*. It was chosen by the children of the state and legalized by joint resolution of the legislature.

FOREIGN STUDENTS OF FORESTRY IN AMERICA

STUDENTS from Sweden and the Philippines, both for advanced work, and other students from China and Canada have been sent to the United States to secure training in forestry, marking an advanced step in the international application of the principles of reforestation of barren areas, and the beginning of cooperative studies along reforestation lines between various nations. This acceleration of the training of men in the great out of



FORESTRY MEN FROM FOREIGN SHORES AT SYRACUSE

Reading from left to right: F. B. Mann, Lindsay, Ontario; A. E. F. Schard, Stockholm, Sweden; H. J. MacAloney, Halifax, N. S.; Mark Y. C. Hwang, Kiukiang, China; Chia Choung Tong, Tien Tsin, China and Luis J. Reyes, Manila, Philippine Islands.

doors profession is the direct result of the war, which caused a realization of the need of the world for trees and timber. Six foreign students are registered this year at the New York State College of Forestry at Syracuse, four in undergraduate work, and two in advanced study, in addition to a larger entering class than has ever before been known in the New York institution. The foreign students come with an unusual record, particularly in two instances, where they are sent by authorization of foreign governments for advanced study. The six foreign students of the New York State College of Forestry at Syracuse are: A. E. S. Schard, Swedish Royal Forest Service, American Scandinavian Foundation exchange fellow from Stockholm, in interchange with Henry M. Meloney, of the New York College, sent to Sweden by the Foundation. Luis J. Reyes, assistant Wood expert of the Philippine Forest Service, graduate of the Insular Forest School of the University of the Philippines, and for the last six years with the Philippine Forest Service. Mark Y. C. Hwang, Kiukiang, China, member of the junior class, sent here through authorization of the Chinese government, to learn how to assist in the reforestation of China. Chia Choung Tong, Tientsin, China, a freshman here for study under the same conditions as Mr. Hwang. F. B. Mann, Lindsay, Ontario, member of the freshman class, in America to study for future practical work in the Dominion.

NATURE IN THE NUDE

THE frosts, the rains and the boisterous blasts have stripped the trees of their green robes of summer and they stand naked—but unashamed.

The leafy tent which the big maple made in your doorway last June is now but a tracery of twigs against the sky. Its delicate fret-work is for the most part as rigid and motionless as if stamped from steel, for it no longer invites the vagrant zephyrs for a romp, and even the northern gale drives through its skeletonized body with almost as little resistance as a ghost would offer.

Yet it is still beautiful. We can now study the great limbs of which there was no hint beneath its summer drapery; the huge, swelling muscles where the limb joins the trunk, the point of greatest strain. Note, too, in the case of the forest maple, the perfect balancing of weight, which is the secret of the straight, columnar bole.

Observe how the oak throws out great, brawny, horizontal branches which suddenly turn and lift skyward, with an abrupt taper, in order that the multitudinous leaves of the growing season may receive their share of sunlight. The branches of the elm, on the other hand, shoot upward first and then turn their tips outward and downward, like a waterfall. But the same end is secured.

If you learn the trees in the spring and summer, with leaf, flower and fruit as your guides, you must learn them all over again in the winter. It is a bit baffling at first, for most botanical manuals seem to assume that trees are to be studied only when in verdure. But it's all the more fun for that.

Now the only clues in your arboreal detective work are the bark, both as to texture and color; the habit of branching; the twigs, by their alternative or opposite position; the leaf scars and the shape, size and color of the buds, which some people may be surprised to learn are all finished before the first frost.

But soon you come to recognize a tree just as you do a friend—instinctively, as it were, with no cognizance of details. The contour is sufficient, and you may in time rival James Russell Lowell, who implies in one of his poems that the etching against a moonlit sky enabled him to name any New England tree.

And it is true that trees look more alike in summer than in winter. In their winter nakedness nothing is concealed; their individuality is blazoned to the discerning eye. The infinite variety of nature in accomplishing the same end is revealed.

Trees, then, become more than trees to us. They become living entities, and we begin to imbue them with the aspirations and sentiments which we ourselves cherish. We begin to understand why John Muir was charged with thinking more of a tree than of a man, and we can enter into the spirit of John Burroughs's reputed retort: "Well, why shouldn't he?"—(Reprinted by courtesy of the *Chicago Evening Post*.)

A CHRISTMAS WALK WITH BIRDS AND BEASTS

BY A. A. ALLEN, PH. D.

ASSISTANT PROFESSOR OF ORNITHOLOGY, CORNELL UNIVERSITY

IT WAS Molly Cottontail that started us off. Her clean-cut tracks across the yard and up the hill toward the edge of the woods invited us to follow and learn her story of the night before. There had been a light fall of snow the previous day and the night had been quiet with a bright moon inviting all of the wood folk to come out for a frolic. Every action was recorded by the tell-tale prints of their feet in the snow and all



THE TRAIL OF MOLLY COTTONTAIL

This record tells us that she was traveling slowly and stopped twice to look around.

previous records that ordinarily would have confused the story had been erased.

What a day for a tramp it was; cold but quiet, and the crisp air sent the blood coursing through our veins and brought the color to our cheeks. Up the hill we went following the route that Bunny had taken. She had crossed the yard at a pretty good pace; we could tell because her tracks were far apart and the prints made by her front feet were far back of those made by her hind feet. When a rabbit hops, its front feet strike first, usually one in front of the other, but the momentum of its body carries its hind feet further forward than the front ones and they strike side by side. Indeed this is true of all hopping animals whose hind legs are longer than their front legs, and it is true of other animals as well, when they gallop. With squir-

rels and mice the front feet usually strike side by side like the hind feet. When Bunny reached the hill her pace slowed up and her tracks were much closer together. We could see where she had stopped for a moment to look around for there were two little marks of her front feet in front of those of her hind feet. She did not rest, however, for there was no mark of her body in the snow. She probably realized she was too conspicuous in the moonlight against the glistening snow to stop long, for on she went to the berry patch just over the top of the hill. Here she delayed for some time nibbling the tender shoots. Several times she had hopped away from the patch for several rods only to return again. We thought she might still be hiding somewhere in the thicket but when we counted the number of tracks going in and coming out there were as many leaving as entering, so we knew she must have gone on. A wider circle about the patch showed us a clean cut trail leading toward a brush pile at some distance and there the



WHERE BUNNY STOPPED TO LOOK AROUND

The pair of circular marks in the center of the photograph were made by the rabbits front feet when she stopped for a moment between jumps.

trail ended. Now for the fun. The first jump on the brush pile gave no response but with the second, there was a slight crackling of the sticks in the far corner and, the same instant, a little ball of brown fur surmounted by the sauciest, fluffiest white tail went bouncing across the snow toward a not distant woodchuck hole. Here Molly Cottontail had had occasion to take refuge

before and no doubt the blessed haven was well fixed in her rabbit memory though it was now almost concealed by snow.

The woodchuck hole was on the edge of the woods and near it was an old oak that we knew to be the home of a frolicsome family of red squirrels. How busy they had been storing acorns last fall and scolding the blue jays and the redheaded woodpecker that competed with them for the fruits of the great tree, but this morning all was quiet. We were about to believe that they were not yet up when we noticed the numerous trails leading



A HUNGRY RED SQUIRREL

Squirrel tracks resemble small rabbit tracks but the front feet always strike side by side.

from the base of the tree in all directions and we knew that we were the laggards. The tracks looked something like small rabbit tracks but the marks of the front feet were always side by side no matter how fast the little animal was traveling. Most of the tracks led out from the base of the tree for a couple of rods to small holes in the snow where the squirrel had dug down for acorns and then they proceeded back to the tree again where he could eat in safety. We wondered how he could remember where each nut was when the ground was covered with snow for he never seemed to make a mistake. Every track was full of purpose, going directly to the spot where the treasures were hidden.

Not so business-like were the tracks of the little deer mouse coming from a nearby stump. Perhaps he had all his stores for the winter hidden in the roots of the stump and came out just for exercise, for though we followed his tracks all about the corner of the woods, we could not discover his particular errand. We knew it was a deer mouse that lived in the stump because of the long hops and the marks made by his long tail in the snow. Occasionally when climbing a hill he apparently held his tail up from the snow so that his tracks looked very much like his cousin's, the meadow mouse, but as soon as he

started down the other side, the long slits in the snow announced his identity. The only other long-tailed mouse that lived in the vicinity, the meadow jumping mouse, we knew was safely tucked away in a snug little nest for his winter sleep. There were other deer mice living in this woodland and all had apparently been out the night before passing and repassing each other so that their trails often made a network of tracks. Sometimes they led up to the base of a tree and did not return so we knew the little mouse had climbed the tree like a squirrel for sheer fun and finally had scrambled down a grape vine that hung from one of its branches. One deer mouse track led up to a bush containing a song sparrow's nest that had been roofed over with shreds of bark and grasses, and when we touched it, a tiny yellow-brown head with two big black eyes and two big ears popped out of a hole in the side as if to say, "Hello, who's there? Then, terrified by the size of her callers, she leaped to the ground and disappeared under a log.

Here and there in the woodland we found shallow furrows in the snow leading into burrows that ran just beneath the surface and then out into furrows again as though the little animal that made them did not know or did not care whether he ran on the surface or burrowed



MAKING TRACKS

This shows how the tracks of the cottontail are formed: the front feet, one behind the other and both behind the larger hind feet that strike side by side.

beneath it. This we knew to be the trail of a short-tailed shrew whose tiny eyes can probably scarcely tell day from night. He is about the size of a small mouse but his fur is short and dense and gray like a mole's and his nose is very pointed. Unlike the mole, however, his front feet are not enlarged and the footprints that he leaves in the bottom of the furrow as he patters along are small and equally far apart. In spite of his small size and apparent blindness, however, he is a wicked little beast for he follows the deer mice and meadow mice into their burrows where he corners them and mercilessly kills them with his needle-like teeth. Such an appetite has he that he seems to have no difficulty in disposing of an entire mouse much larger than himself for he leaves only the



COMING AND GOING

The trail of a deer mouse in soft snow. The separate marks of front and hind feet cannot be distinguished but the mark of the long tail behind each track is clearly defined. Which way did he go?

skin turned neatly inside out. He seems equally at home in the woods and the fields and on this day we found his trails almost as frequent as the tracks of the mice, perhaps because the mice do a good deal of their running on the surface of the ground beneath the snow.

Especially is this true of the fat little meadow mice that seem to have difficulty in jumping in the soft snow and prefer to burrow through it. In places where the snow was hard, however, their tracks were plentiful enough,



THE DEER MOUSE

His large eyes, big ears, rich yellow-brown upper parts and snowy white underparts make him a most attractive little beast. He is also called the white-footed mouse.

looking like miniature squirrel tracks, the short tail only occasionally striking so as to leave a mark. So many enemies have the meadow mice that it is little wonder that they scarcely dare show themselves above the snow. The hawks by day, and the owls, raccoons, weasels, skunks, foxes and cats by night combine to keep him ever on the alert. At this particular time, however, he had little to fear from coons or skunks, for the weather had been cold for weeks and they were snugly asleep enjoying their partial hibernation and waiting for a few warm days and nights to awaken them.

We noted, however, that the weasels were out for we followed the paired tracks of one back and forth along the edge of the woods, observing how it had loped over the surface and burrowed beneath by turns. Never a brush heap or a stone pile was passed by the inquisitive beast without a thorough exploration of all its nooks and crannies for some shivering mouselet. We knew that he was not entirely nocturnal in his explorations and as the tracks were still fresh we kept our eyes ahead for the slightest motion. During the winter the weasel's



HAS MANY ENEMIES

The hawks by day and the owls, cats, weasels, foxes, raccoons and skunks by night combine to keep the little meadow mouse ever on the alert.

coat is pure white except for the black tip to its tail and one has to look closely to see this or his beady black eyes and muzzle when everything is white. At last the tracks led to a pile of logs and did not lead away so we knew that he was somewhere beneath. Instead of turning over the logs to hunt for him we sat down near one end of the pile knowing that if his natural inquisitiveness did not bring him out, a few "squeaks" would. Somewhere in the distance a flock of crows were mobbing a sleepy owl and a couple of blue jays screeched their displeasure over the presence of a squirrel in their favorite tree. But close at hand all was silent save for the lispings of a few chickadees hunting about the tips of the hemlock branches. We had not long to wait. A feeling gradually came over us that we were being watched and sure enough, a slight movement of something drew our atten-

tion to two shining black shoe buttons in a crevice and a tiny black muzzle which quivered slightly as though it did not like the smell that was being wafted in its direction. The animal, itself, we could scarcely distinguish from the snow all about it. When the eyes suddenly disappeared, considerable of the snow disappeared with them and we knew that we had seen more of his lordship than we realized. Not a sound did we hear in the log pile but suddenly in an entirely different place we perceived the shining eyes once more gazing intently at us. Several times he appeared and disappeared as though he were playing a little game with us, so we thought we would respond. I put my hand to my lips and gave the "young bird squeak" that is so successful in drawing birds during the nesting season. In an instant his entire attitude changed. Out popped his whole



A MEADOW MOUSE SPEEDWAY

When he ventures into the open, the meadow mouse is exposed to many enemies and must put on the high gears. He lost no time in crossing and recrossing this open stretch.

serpent-like head and shoulders, his head turning first one way and then the other and his little muzzle sniffing the air to detect the whereabouts of the breakfast that his ears had just heard. Back into the logs he went and then out of another crack much nearer. He was all attention and his little muscles seemed to quiver with excitement but his offended nostrils told him that there was nothing near but his huge and dreaded enemies, and, after a few more passes, he disappeared.

Our path now led us to the creek which was frozen over except in the swiftest places. Out from one of these led some broad pigeon-toed tracks with an uninterrupted clean cut furrow following between them that we knew could have been made by none other than "Major Muskrat." Where the snow was a little deeper his body made a broad furrow and always his heavy flattened tail cut down into the crust behind him. He apparently was not bent on feeding for his tracks merely lead to the next hole in the ice and cloudy water streaming from a hole



THE BURROWS OF THE SHORT-TAILED SHREW

His minute eyes seem barely to distinguish light from dark and he furrows the surface or burrows beneath without seeming to know the difference.

in the bank told that he had not disappeared very long before and was still inside his burrow. Down in the marsh his brothers had built a nice warm house like a beaver's, but this creek-dwelling muskrat had to be satisfied with a hole in the bank.

Crossing a stubble field we could see where a flock of



"THOUGH SHE BE BUT LITTLE, SHE IS FIERCE"

The weasel is a blood-thirsty little beast and is never more vicious than when caught in a trap. In the north, its fur is white in winter and the best grades are known as "ermine." In the summer its fur is reddish brown.

crows had held a breakfast party, digging down for the corn cobs which they had stripped of nearly every kernel earlier in the season. A delicate tracery on the snow beneath a patch of ragweed showed where some small birds had been feeding and the position of the tracks one



A PHEASANT PASSED

The front toes are set at a wide angle and the imprint of the hind toe is a mere dot. The tracks are clean cut and the toes do not drag.

behind the other and the marks of a long hind toenail proclaimed that a flock of horned larks had paused to feed there.

Along the edge of the field a row of large angular tracks announced that a much larger bird had gone by. The three front toes were set at a wide angle and the imprint of the hind toe was a mere dot. The tracks were clean cut and the toes did not drag so we knew that a pheasant had passed that way. We followed his trail through a clump of weeds and then down a little gully through some burdocks where he had apparently stopped for a few moments to feed. Then he continued his

course to a patch of deadly nightshade whose red berries with their belladonna held no fears for him, for we could see where he had jumped after some of the berries that were just out of reach. He apparently had had a good meal, for his tracks then led off into a tangle of sedges where he jumped up almost from under our feet and got away with a great crackling and whistling of wings.

Nearly every sheltered spot held some surprise for us that morning for the happenings of the previous night were plainly written in the snow diary. It mattered not that we had actually seen only a few of the little creatures for we could easily imagine them present and could reconstruct their lives from the records which



THE HOME OF THE MUSKRAT IN THE MARSH

Along the creek the muskrats live in burrows but where material is available they build these beaver-like houses.

they had left. We had seen only a few birds and only three animals but we returned home with the feeling that the woods and fields were teeming with life and that after all a walk at Christmas time could be just as full of interest as one at any other season of the year.

THE ANNUAL MEETING

The annual meeting of the American Forestry Association will be held at 2 P. M., Tuesday, January 13, 1920, in the Assembly Room of the Merchants' Association, Woolworth Building, 233 Broadway, New York City.

There will be no forestry program. The meeting will be confined to business matters and the election of officers.

Later in the year the directors will decide upon the advisability of holding a national forestry conference for the discussion of forestry problems.

THE RACOONS OF NORTH AMERICA

BY R. W. SHUFELDT, M. D., C. M. Z. S.

OF ALL the different kinds of racoons in this country, the habits of the common eastern species are doubtless best known, and, in the main, this is the form referred to in the following paragraphs. The habits of the four or more forms of the South and West may differ more or less, but only to such an extent as they have been influenced by environment, nature of the country inhabited, what is required to obtain the different kinds of foods, and escape from the different kinds of enemies to be found in the regions they inhabit. Aside from all this, however, racoons are racoons wherever we find them, and the general habits of any one of the subspecies will be found to be more or less identical with those of the common species. Of recent years 'coons have been on the increase throughout some of the New England States; it is from such places that we now get good accounts of

'coon hunts, and new chapters on the life history of this interesting animal.

Mr. George E. Moulthrop, of Bristol, Connecticut, sent a very good account of hunting racoons in his State. He says: "There is probably no section of the state of Connecticut where fox and 'coon hunting is more generally indulged in. The Bristol sportsmen have always owned the best foxhounds and 'coon dogs in the state. Some of the hunters have become very prominent in this line of sport, and none more so than the late W. Barnes, who was the most famous racoon hunter

in the country at the time of his death. A 'coon hunt in this vicinity baffles all description, and it must be attended in order that one may appreciate the excitement that prevails during the entire time of its happening. It comes up to the highest pitch, perhaps, when the dogs have succeeded in putting up into one tree from two to four vigorous old 'coons. It is easy to imagine such a scene, with from two to four of these crafty and plucky

animals up in a thick hemlock tree, fifty or seventy feet in height, with a group of excited men beneath it, carrying lanterns, and promiscuously armed with revolvers, guns, rifles and clubs. With them is a pack of yelping and howling dogs, eager to have the infuriated 'coons tossed down to them, so they may enter into the fray as soon as possible. The climbers quickly ascend; and often they are in luck if, instead of 'coons, they do not meet, in the dense foliage of the dark hemlock, a by



THE COMMON RACCOON OF THE EASTERN STATES

Photograph from life by the author. These coons have a habit not indulged in by any other animal. If given a piece of raw meat they very carefully wash it before eating it.

no means to be despised wildcat. On one occasion this very thing happened; and when the animal was finally slain, it was found to weigh no less than thirty-five pounds. After some little difficulty, the 'coon is at last shaken down; and in the mix-up that follows, in which men, dogs, and all take a hand, there is excitement enough to satisfy the most fastidious. When two or more 'coons are in a tree, generally the remaining ones escape to neighboring trees, and make off through the woods. Then the hunt is on again with even renewed and greater excitement. Occasionally the animal escapes over

some rocky ledge inaccessible to both dogs and men."

This excellent account of a 'coon hunt must answer as a description of one of those interesting hunts; they have for years occurred all over the country, and the variety of incidents would furnish food for a volume.

As much as the writer has shot and collected during the past fifty years, it was not until about the early 80's that he really came into a part of the country where racoons were abundant, and where he could study the various and interesting phases of their life history. Those were pleasant days when, long ago, he collected in the dense old cypress swamps of the Louisiana lowlands, south of that most fascinating city, New Orleans. It was his greatest delight to get far into those sultry, dark, dismal, and far-reaching stretches of heavy cypress timber, where the trees were festooned with masses of "Spanish Beard." Great moccasin snakes lurked there; and some parts, rendered impenetrable by fallen trees, tangled vines, and deep holes filled with slimy water, were the chosen resorts of alligators and many of the smaller reptiles. Overhead, among the palmettos, the cypress limbs, and masses of subtropical creepers, one's eye often caught the scarlet flash of a

male cardinal, as he inquiringly looked down, or the flaming, orange breast of an old male prothonotary warbler, busily engaged in searching for insects in the brighter regions above the gloom.

Passing to where the footing is somewhat drier and the shade not quite so dense, other forms are met with, and more birds reward search. Presently, part way up a pecan tree, you can recognize an old 'coon rolled up

on a limb close to the trunk. Your stealthy approach was unnoticed until too late; the 'coon now has no means of escape, and evidently hopes you will pass by without noticing it. But in this it is mistaken. Coming to the foot of the tree and gazing up at the old rascal, one is strongly reminded of the old story of Captain John Scott, who had slain hundreds of 'coons, and whose rifle, it was said, had never missed one; the legend runs something after this fashion:

'Coon up in tree—"Who are you, stranger, down there?"

Captain Scott—"Why, my name's Scott."

'Coon—"Do you mean Captain Scott?"

Captain Scott—"Yes, I'm the man."

'Coon—"Do you mean Captain John Scott?"

Captain Scott—"The very same."

'Coon—"Well! If that's so, don't fire; there's no kind of use. I'll come right, straight down."

But the old fellow the writer had so suddenly come across was in better luck, as he had no intention of taking its life; and after a little it was left quite unmolested. They were very common in that region, and many people, including the negroes, kept them as pets.

Further south many still enjoy the sport of hunting this wily ani-

mal on moonlit nights with a pack of dogs; and, owing to the nature of the country, it is a more arduous task than in the northern States. The animal more frequently manages to elude its pursuers. The writer had them alive several times while living in New Orleans; but they were extremely troublesome pets, and quite as mischievous and amusing as a small monkey. On the night of its capture, a very large animal was chained in



THE RING-TAILED RACCOON OF THE SOUTHWEST

This animal is lively and playful, and runs along the branches of the trees with the agility of a squirrel. It is shy and retiring. Its food consists of birds, insects and small quadrupeds. Courtesy of Mr. Hollister, Superintendent of the National Zoological Park, at Washington, D. C.

the yard by a small chain on its hind leg just above the foot. In the morning the foot was found gnawed off just at the point where the easy-fitting link was attached, and the raccoon had made good its departure. It could not endure being made captive, and the relic and chain plainly read: "You may keep the foot, but I must have my liberty."

Racoons will feed upon almost anything. They are very fond of eggs of all kinds, as those of birds, turtles, and snakes; and they also eat grapes, berries, nuts, some roots, and many insects. "All along the coast in the southern States," says a writer, "he finds a species of oyster in which he delights; though we are told he sometimes pays dear for the whistle, as he gets his paw caught by a fixed shell, and, unable to escape, he is

chance to capture one. Some reptiles are also caught and eaten by them, especially snakes. Between flexible snout and wonderfully nimble fore paws, it is indeed capable of prying into and nosing out almost anything that its mischievous mind leads it to do. As already pointed out, it is an excellent tree climber; and woodpeckers, who build where 'coons are plenty, had better bore their holes pretty deep if they care about the safety of their eggs. "Thus," says a writer about them, "the raccoon is an animal of large resources and marked character. He goes prowling about by night as well as by day. He is a fisher, a hunter, a trapper, a reaper, or a fly-catcher, as occasion may require. He is instinctively cunning as a fox, inquisitive and meddlesome as a monkey, greedy as a bear, sly as a cat. In northern



YOUNG OF THE RING-TAILED RACCOON

Photograph from life by the author. These coons are easily tamed and among Mexicans it is domesticated, when it becomes a playful pet and catches rats and mice.

drowned by the returning tide." These are the "raccoon oysters" we hear of; but the writer never knew of a raccoon that was drowned in that way, nor of anyone who could verify such a tale.

In rearing their young, raccoons usually build a nest in a hollow tree, or occasionally in other convenient cavities in the woods. In still rarer instances, they dig furrows of their own, where, in the spring, the female gives birth to her young, the litter varying from three to half a dozen, each being the size of a common rat. Their eyes are closed and for some time they are very helpless; but when a month old, they are very cunning little animals, not to say pretty. It is said that the old ones are not averse to eating a duck or a chicken, should they

climates, on the approach of winter, he retires to his home and sleeps like the bear till spring, or only goes abroad occasionally in fair weather. In the South he is active during the entire year."

Above everything else the raccoon loves the young, green corn, or at that stage of its growth when it is said to be in its milk. He will steal into a cornfield at night, and in the most wasteful manner possible, strip ear after ear, eating his fill of the best he can find, and thus destroying many ears that would mature later. No wonder the farmer is down on him and will shoot him on sight whenever opportunity offers.

In the matter of feeding on fish, the raccoon is not at his best; although a fairly good swimmer, he is not fitted

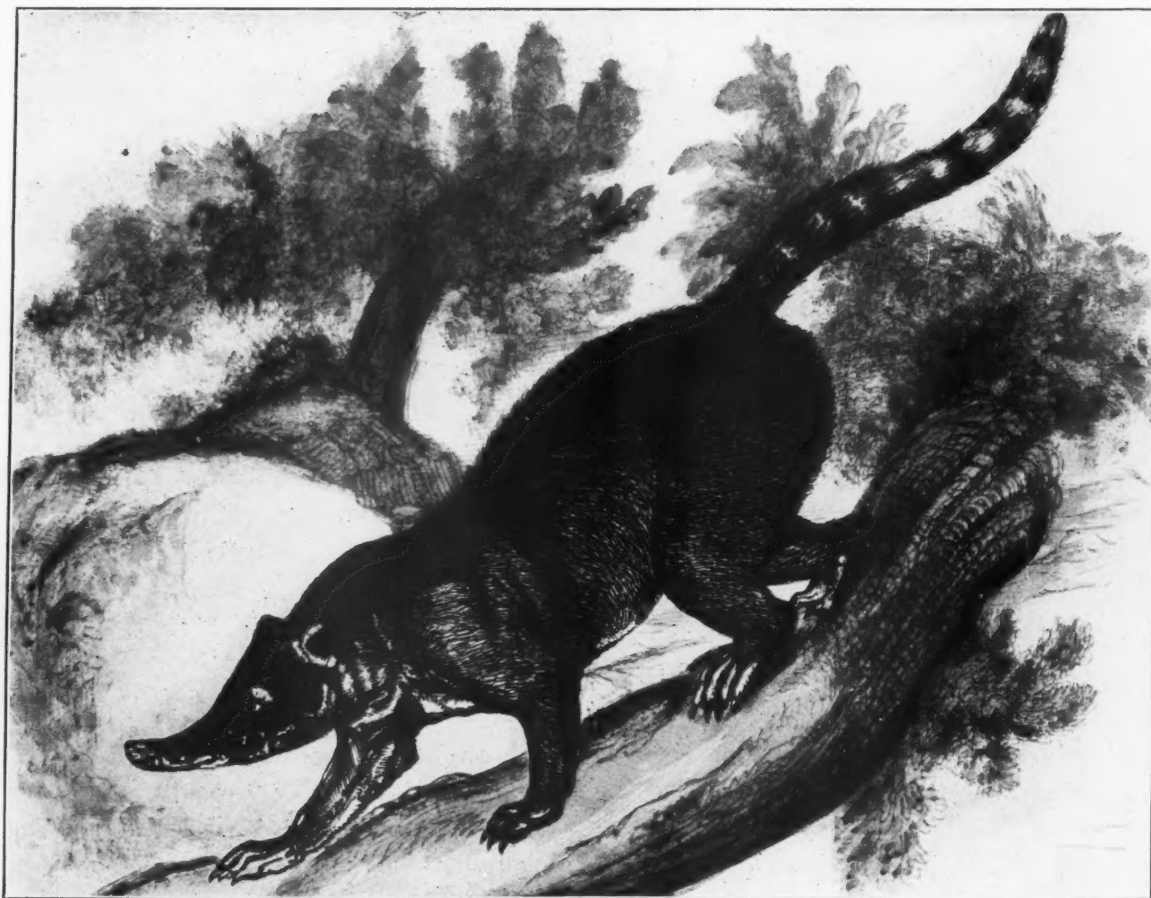
to pursue fish in the water, though he may, sometimes, capture them in other ways. He very much prefers to hunt at night rather than in the day time; and where the forests are thick, he passes along from tree to tree as readily as on the ground, robbing nests in his course, or pouncing on their owners, or snapping up such insects as fail to get out of his way.

The racoon has a habit that is not indulged in by any other animal. If given a piece of meat, he will not touch a mouthful until he has washed it in as clear water as he can find, and he will allow no one to do this for him. So thoroughly does he perform this task, that he not only soaks all the blood out of the meat, but actually reduces the morsel to a very uninviting, flabby piece of pale flesh. He will roll it over and over in the water with his fore paws, and give it occasional shakings by seizing it in his mouth. Finally, when it is semi-macerated to his liking, he will devour it with apparent relish. The writer has tried racoons with pieces of raw meat; and, although the animal will hold the piece in his mouth, he will immediately commence to hunt around for some water to wash it in. Failing to find any, he soon exhibits his distress and annoyance; in fact, he must be very hungry indeed before he will condescend to eat a piece of raw meat that he has not previously washed to

his complete satisfaction. Racoons will also wash an ear of corn in the same fashion, and it was this habit that prompted Linnæus to bestow the specific name of *lotor* upon this interesting animal.

In their "American Animals," Stone and Cram say that the racoon, "like most other climbing animals, make frequent use of the nests of hawks to sleep in. At other times they flatten themselves along the thick branch of a tree, their gray fur harmonizing admirably with the color of the bark, or else they ascend to the tops of densely foliated hemlocks, and, circling their fat bodies completely around the main stem, doze away in comfort, supported by the numerous elastic branches about them, quite invisible from the ground. If a company of blue jays discover one in this position, there is sure to be a tremendous racket right away, their shrill voices jarring the quiet of the tree-tops like an alarm clock set to awaken the 'coon from his slumbers."

The racoon has a peculiar cry at night; it is not unlike the note of several species of owls that inhabit the same region, and may easily be mistaken for it. Tame racoons, especially when they have been reared from the young, are wonderfully playful in captivity, and will often amuse themselves by the hour toying with any small object suspended a foot or so above the ground by



AN ADULT COATI-MUNDI

Redrawn by the author. In nature this animal is met with in troops made up of a number of individuals. They are excellent climbers and feed upon honey, insects, eggs, various fruits and vegetables, small quadrupeds, and probably other animals.

a string. The knowledge of this, and the habit the animal has of running the entire length of every fallen tree he comes across in his rambles in the woods, has suggested to trappers an easy means of capturing him. All that is necessary is to set a strong steel trap on the upper side of any long tree trunk lying upon the ground, and suspending directly above it by means of a string any small, bright thing, such as a piece of tin, at a height that a 'coon can reach by standing on his hind legs. It is certain to tempt him, either on a moonlit night or in the daytime. Utterly regardless of the naked trap beneath it, he at once stops in his course to have a toss with it, and the chances are that, inside of a minute, he knows what it means to have a big steel trap seize him by one of his hind feet. His liberty—maybe his career—is at an end, unless he resorts to gnawing the fastened foot off above the point of seizure.

When they sleep away the cold snaps in the winter, it is not an uncommon thing to find a whole family, or maybe several families, curled up together in the hollow of some big tree. If the weather chances to become warmer, they will drowsily awaken; and if it is very pleasant, they will all come out, descend, and prowl around through the woods in the neighborhood of their winter home. Occasionally they find something to eat at this time; still, toward spring, they become very thin and hungry, and do not get fat again until early in the summer, when all kinds of food is once more to be found in plenty. If there is snow on the ground, their characteristic tracks may easily be recognized. With the oncoming of another cold snap, the entire party at once hie themselves to their hollow to sleep through it, huddled up together like a lot of squirrels.

Although the ring-tailed racoon can hardly be considered a game mammal, it is one, in a sense, as it is an animal that may be eaten or shot for its pelt. In any event, the hunter in the southwest desires to know something about it when he meets with it—hence this brief description. The habits of this animal are still but little known owing to the fact that it is almost entirely nocturnal, and resides in the rough, rocky, and heavily timbered regions.

The ring-tailed racoon is a small animal, with an elongate, slender body. As will be seen in the cut, it

has a very long and somewhat bushy tail. This is banded black and white, the extremity being black. Its muzzle is pointed, and its eyes and ears are rather large.

An account says about its disposition that "this animal is lively and playful, running along on the branches of the trees with the agility of a squirrel. It is shy and retiring, and speedily flies to its retreat, which is a hole in a tree, at the slightest alarm. Its food consists of birds, insects, and small quadrupeds; it is said to also feed on the pecan and other nuts, though this is doubtful. Sometimes it scolds or barks at an intruder, holding its tail curled over its back. It is easily tamed; and among the Mexicans it is domesticated, when it becomes a playful pet and catches rats and mice. It produces three or four young at a birth."

But few lines can be spared here for description of

the Mexican coati. Upon seeing this animal, one is at once struck by its long and flexible snout, and the general elongation of the body and tail. It is about the size of a large cat, and it is said it has a habit of gnawing off its tail at the root; but the writer cannot in any way vouch for this. The coatis are excellent climbers, and they feed upon honey, insects, eggs, various fruits and vegetables, small quadrupeds, and probably upon other animals. When once tamed they become gentle, and they have not a few amusing habits in confinement. However, they are restless and possessed of all the curiosity of a 'coon, to which they are more or less nearly related.

At the present time there is no mounted specimen of this animal on exhibition in the United States National Museum, and there are very

few reliable cuts of it extant. This being the case, the writer has reproduced a figure from one of an old work on natural history, which gives an excellent idea of the animal.

The typical racoons and their allies is a comparatively small group of mammals exclusively American in their habitat; they constitute the family *Procyonidae*, containing, according to most authorities, five well-recognized genera, namely, *Procyon*, *Bassariscus*, *Bassaricyon*, *Nasua*, and *Cercoleptes*. The first of these contains the type of the genus to which it belongs—the common racoon of the United States and its subspecies; also the crab-eating racoon of South America, and perhaps



THE RACOON HOUSE IN THE NATIONAL ZOOLOGICAL PARK, WASHINGTON, D. C.

In this quaint little log cabin reside numerous individuals of the common Racoons. There are both adult and young specimens, and all of their habits may be studied here to the greatest advantage. Frequently they climb among the topmost twigs of the tall tree to the right, not far from the foot of which is placed a small, cement-lined pool, in which they wade about and where they are often seen washing their food.

others. In *Bassariscus* we have the ring-tail *Bassariscus*; also *B. sumichrasti* of Central America, and possibly others. *Bassaricyon* is not represented in our fauna, neither is *Cercoleptes* of South and Central America. *Nasua* contains the coatis and coati-mundis, and of these Flower recognized two species, the Mexican coati (*N. narica*) and the South American species, *N. rufa*. It is claimed that the first named has occurred over the Mexican boundary line, in the southwestern part of the United States.

In the true racoons the body is rather stout, with the head broad posteriorly, but tapering to a pointed muzzle anteriorly. The feet are plantigrade and their soles without hair; toes all free and capable of being spread wide apart, especially in the case of the forefeet. Claws are non-retractile, curved, compressed, and acute. The cylindrical tail is moderately long, annulated, and inclined to be bushy. Pelage somewhat long, coarse, and thick. The ears are rather short.

The *Bassariscus* somewhat resembles the true racoons, but the body is more elegantly proportioned, and slenderer. In the short head the muzzle is markedly pointed. The tail is longer and conspicuously annulated; the ears are large. The soles of the feet are hairy but the pads are hairless.

The species of the cogenus *Nasua* depart considerably from the general form and appearance of the typical racoon; both head and body are elongated and somewhat laterally compressed. The non-prehensile, annulated tail is also long and tapering, while the muzzle is mobile and inclined to be turned up.

CUTTING WOOD FOR FUEL

MANY farmers now have their home supplies of wood for winter fuel, but the town markets will keep active for several months, and thousands of cords of wood will still be cut for local use on the farm.

In cutting cordwood, an excellent opportunity is afforded to improve the woodland by removing the poorer, less valuable trees, leaving the better ones to grow. Many farmers who have never before given this subject a thought are taking a real interest, because they see how quickly nature responds in better growth when given a little guidance and aid.

The kinds of material to be removed for firewood include the old trees unsuitable for lumber, crooked trees crowding out straight ones, badly diseased and decaying trees, small trees overtopped and stunted by larger and better ones, dead trees that are mostly sound, tree tops left from former cuttings, and trees of the less valuable kinds, where others of greater value are present which need the room and will prove faster money-making trees. Handling farm woodlands rightly is an indispensable part of profitable farm management.

If lists of manufacturers or other information are desired regarding portable wood-sawing outfits, and wood-splitting and tree-felling machinery, the Forest Service of the Department of Agriculture will be glad to furnish such material upon request.

NURSERYMAN BELIEVES IN DYNAMITE

BY O. B. STRAYER

THERE is considerable controversy in the agricultural papers as to whether it pays to use dynamite in tree planting in the sandy loam soils of Southern Alabama, where a great deal of pecan and satsuma orange planting is going on. Ordinarily I should say that it does not pay, because the open-soil types do not need blasting. However, I find that the J. M. Kroner Nursery, of Theodore, Alabama, does not agree with this view. They use and recommend dynamite in their tree-planting operations.

Not only that, but they have used it to subsoil their nursery plots, and claim to have gotten excellent results from the practice.

However, there is a reason for that that may not exist in all parts of the region. A little way beneath the surface of the soil there is around here a thin layer of hardpan. Sometimes it will not be over three inches thick. It is very seldom found to be over 15 or 18 inches in thickness. Nevertheless, it is very impervious to moisture, and it is difficult for the feeding roots of young trees to penetrate it. It is to break up this layer of hardpan that Mr. Kroner advocated blasting. He says that the trees they have planted on these hardpan soils have done exceptionally well as a result of the treatment; when dynamite has not been used, and the hardpan comes up close to the surface of the ground, shallow, lateral-rooting of the trees has resulted, and many of them have been difficult to cultivate and others have died from lack of moisture.

Shallow-rooting is a habit of the satsuma orange tree. Nevertheless, the roots do not want to come up so close to the surface that the top soil cannot be cultivated.

As for the pecan, of course, everybody knows it is a tap-rooted tree, and if it is to do well it is absolutely necessary that it should be able to send its roots down deep into the soil. If a layer of hardpan prevents that, the tree is almost certain to be a sickly specimen, assuming that it lives at all.

FIGHT WOODS FIRES

Forest destruction is quick — forest growth is slow.

Everybody loses when timber burns. The forest exerts an influence that modifies local extremes of heat and cold and benefits crops, live stock, and man.

Burned timber pays no wages — keep the forest productive.

Take no chances with lighted matches, burning cigarettes or pipe ashes, brush fires, or camp fires.

A tree will make a million matches — a match may waste a million trees.

When a fire is discovered, put it out if you can. Get help if you need it.

Are you practicing fire prevention and forest protection?

MEMORIAL TREES IN 1920

NOW comes 1920 and with it greater promise for tree planting than any year in the history of our country. In memorial tree planting there has been brought about a great awakening to the value of trees. The American Forestry Association has never before in its history had so great a number of inquiries in regard to tree care and tree planting. With the closing of the war came the thought of memorials and the living, growing tree was suggested and then urged by the association as the memorial of the individual. Now the tree has

become the memorial of the town, city, county and state.

In the schools throughout the land there has been created an amazing demand for tree knowledge and the American Forestry Association is pleased to announce that plans are being worked out whereby tree planting will be fostered in thousands of schools throughout the country. The planting of a memorial tree for Lieutenant Quentin Roosevelt by the pupils of Force School, Washington, D. C., which young Roosevelt attended while living in the White House, has been a great inspiration to



MEMORIAL TREE FOR PHILADELPHIA NURSE

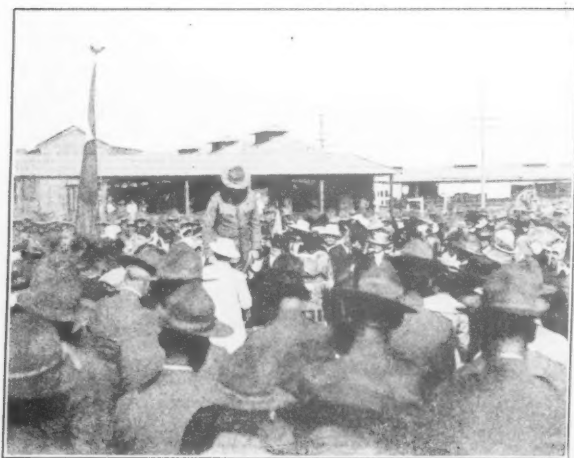
This tree, beside which Dr. Richard H. Harte, head of Base Hospital No. 10 is standing, was planted on the grounds of the Pennsylvania Hospital, Philadelphia, for Miss Helen Fairchild, who died in France. Five other trees were planted in memory of men of that Base Hospital. The trees have been marked by Mrs. Arthur Gerhard who registered them on the national honor roll of the American Forestry Association.

thousands. The American Forestry Association received the following telegram in regard to it:

"We wish to express our appreciation of your action. So many of my brother's happiest associations were connected with the old Force School.

"THEODORE ROOSEVELT."

With the planting of that tree there was adopted a plan which is being put forward in many schools. There is at Force School a self-perpetuating "Quentin Roosevelt Memorial Tree Committee." Miss Janet McWilliam, the principal, appointed a member of each class as a committee to care for the tree and this committee is to remain on the school rolls through the simple process of allowing each member to name his successor when he passes to another class. In this way there will be a tree committee at Force School as long as the tree and the



THE TREE PLANTING AT KEARNEY, CALIFORNIA

This is part of the crowd that witnessed the tree planting, and General Strong stands in the center of this group.

school shall stand. The members of this first committee are: Oliver Gasch, 8A; Frank Norris, 7B; Earl Moser, 7A; George Wales, 6B; Alice Spalding, 6A; Burke Edwards, 5B; Virginia Douglas, 5A; Nell Tysen, 4B; Nancy Fair, 4A; Mary Church, 3B; Lindsay Payson, 2B, and Dorothy Harrison, 1B. At the planting of the tree the tree day program of the American Forestry Association was used. The pupils who were assigned to "What the Tree Teaches Us," were: Lillian Rixey, Edna Kelley, Miriam Latterner, Duncan Bradley, Henry Wilson, Richard Bedon, Juliet Frost, Oliver Gasch, Virginia Fourier, Anna Hereford, Margaret Watts, Robert T. Norman, Harry Lamberton, Roger Robb.

But tree planting is not a matter of this year or even of next, for the country is now experiencing, through the efforts of the association, a great campaign of education as to trees. A fine example of what comes of tree planting propaganda is seen at Rockford, Illinois, where a tract of 150 acres has been purchased by the

Park Board and named "Memorial Park." The intention is, Paul B. Riis, the superintendent, informs the association, to plant a memorial tree in the park for every man who enlisted from the county. This means that somewhere in the neighborhood of 3,500 trees will be planted. Playgrounds, golf links and picnic grounds are to have trees. Are the members of the American Forestry Association awake to the good work that can be done by each one in his locality if he or she will but take the lead? John A. Collier Wright, of Gilbertsville, New York, is working for plans for reforestation and for "Roads of Remembrance" in Otsego County. He reports to the association that a survey in Broome County shows there are 14,000 acres of waste land suitable for reforestation. Frederick W. Kelsey, of New York City, contributed a fine letter to the *New York Times* in regard to the work of the association, which that paper used in full. It will be seen that the newspapers are eager to hear about the values of tree planting particularly if they hear it from their own readers.

Where there are trees is where the association finds the keenest activity for having more trees. This is particularly true of California where the California Federation of Women's Clubs, through Mrs. P. B. Goss, chairman of the department of conservation, is making plans



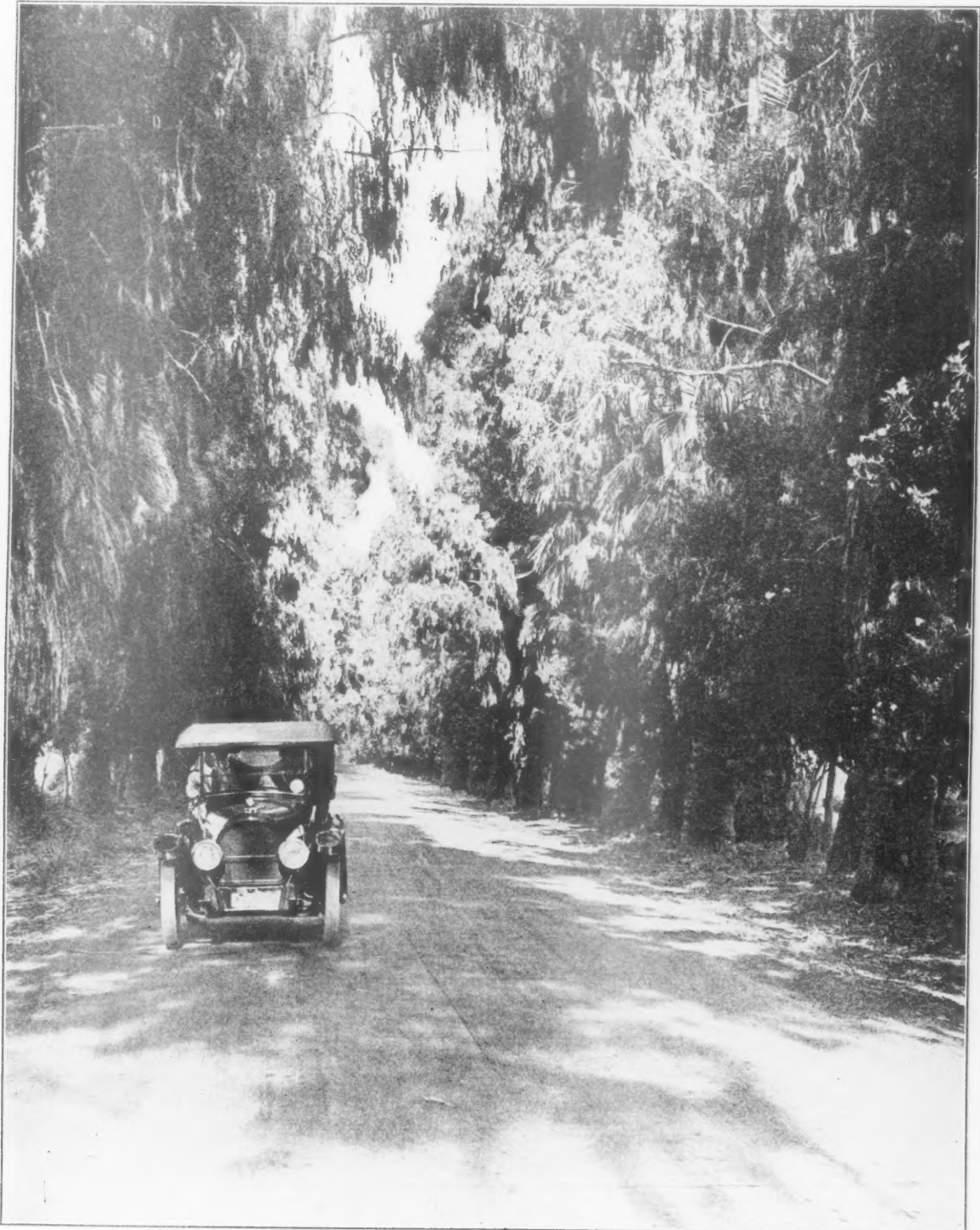
THE FIRST SHOVEL FULL OF EARTH

The first shovel of dirt for the memorial tree planting at Camp Kearney, California, was turned by Mrs. Isabella Churchill, of the Colorado State Society of San Diego.

for an active campaign for memorial tree planting. In Georgia Mrs. Julia Lester Dillon, of the same organization had thirty-one district clubs planting a Memorial Park on Arbor Day in each district. Georgia will carry off the blue ribbon, if one is awarded, for memorial tree planting if other states do not hurry. The year 1920 will be a big one in tree planting and each member of the association can help to make it bigger. The time to start is now.

WHEN MEMORIAL TREES ARE PLANTED PLEASE INFORM THE AMERICAN FORESTRY ASSOCIATION, WASHINGTON, D. C.

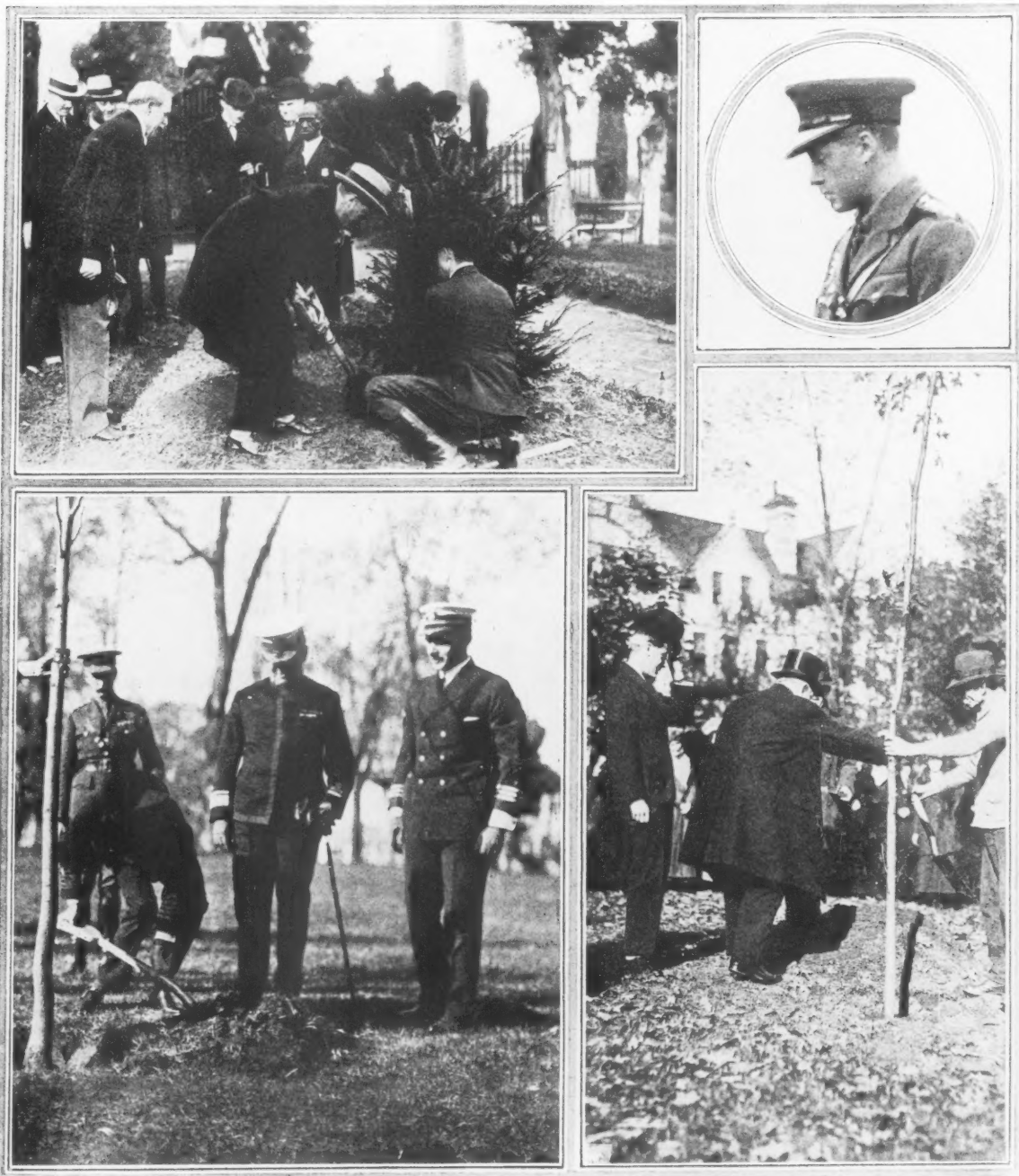
THE EUCALYPTUS SHADES THE WAY



Underwood and Underwood

A hundred years from now the memorial trees you plant will tell the story of the glory of those for whom the trees were planted. Trees such as these at Fresno, California, show what can be done with the "Roads of Remembrance" idea of the American Forestry Association.

TREE PLANTINGS BY THE PRINCE OF WALES



At the top the prince of Wales is shown planting a tree at Mount Vernon, Washington's home. On the right he is seen taking part in the tree planting at Mount Saint Albans Cathedral, Washington, D. C., and doffs his hat while Bishop Alfred G. Harding places the tree. In his navy uniform the prince is seen wielding the shovel at Annapolis during his visit to the Naval Academy. This picture is by Underwood and Underwood and the other three are by Harris and Ewing.

THE PRINCE PLANTS A TREE IN CENTRAL PARK



Western Newspaper Union

On November 21, the prince of Wales planted an English Elm tree in Central Park, New York City. It was placed 100 feet from a rugged American Elm planted by his grandfather. The Prince was welcomed by Charles Lathrop Pack, president of the American Forestry Association, and Dr. George F. Kunz, president of the American Scenic and Historic Preservation Society. The Prince, flanked by his two aides, is seen advancing to take the shovel at the right of Secretary Percival S. Ridsdale, of the American Forestry Association.

A REAL "ROAD OF REMEMBRANCE"

*Underwood and Underwood*

This road is on Missionary Ridge, a scene of one of the famous battles of the Civil War and finely shows the possibilities of road side tree planting along our highways as memorials for the heroes of the World War.

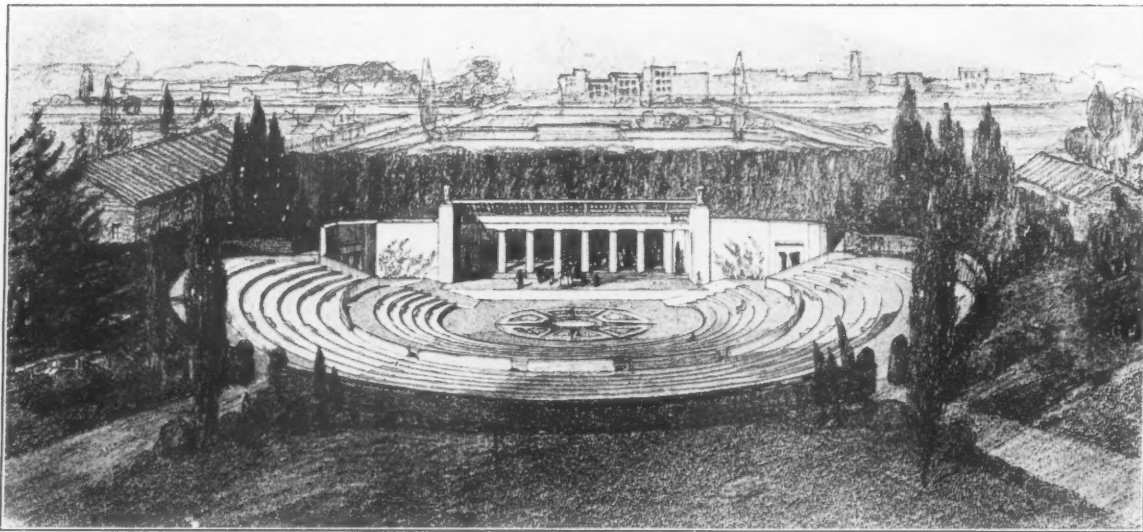
JOHN BURROUGHS TO THEODORE ROOSEVELT



Courtesy The Garden Magazine

John Burroughs planted a tree in memory of Theodore Roosevelt in the grounds of Country Life at Garden City, New York, the corner stone of which Colonel Roosevelt laid. The naturalist selected a maple and promised himself some "fine maple sugar twenty years from now." The naturalist will be 84 years young next April.

MEMORIAL TREES THE PROPER SETTING.

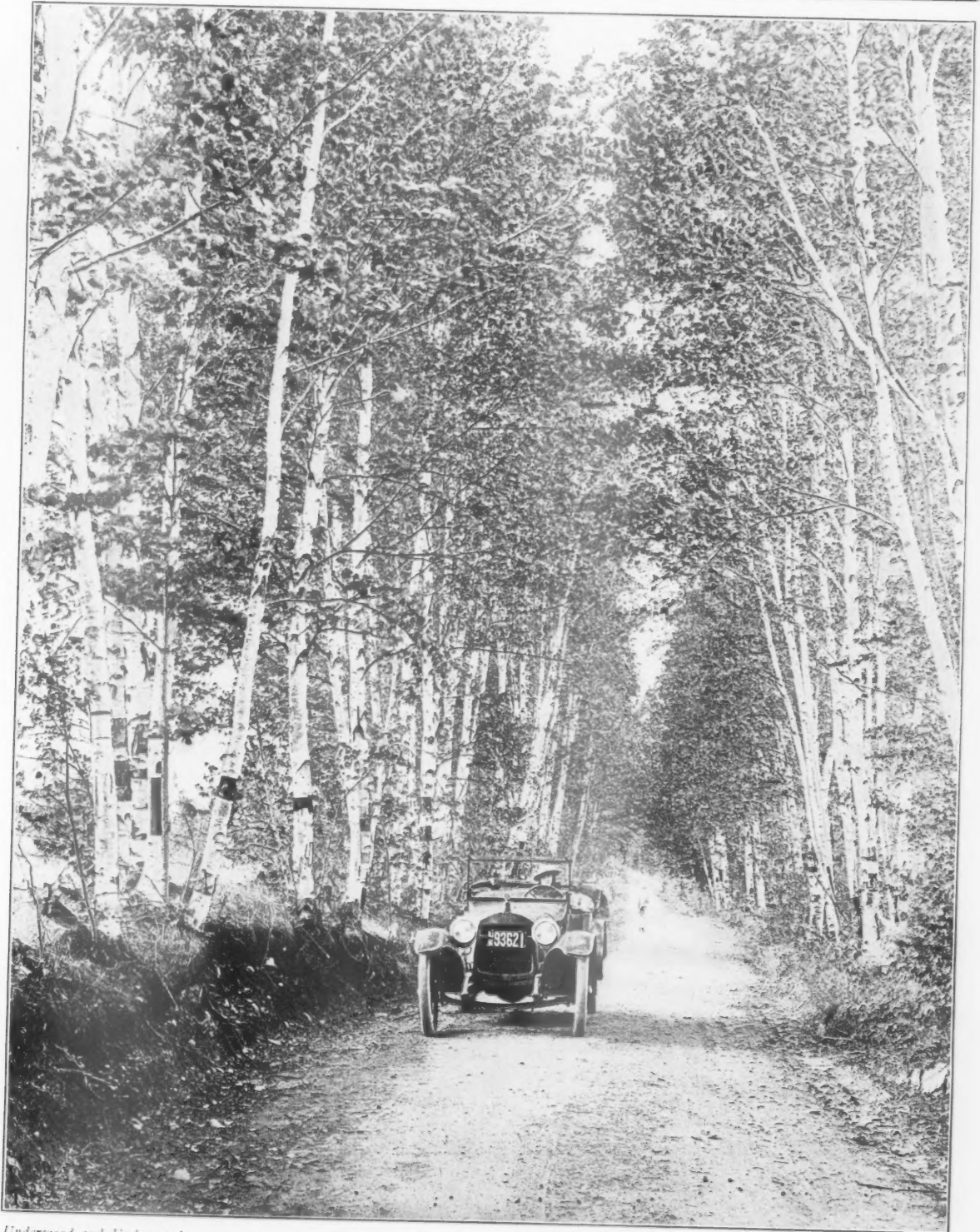


Allison and Allison, Architects.

That memorial trees should be the proper setting for whatever form a memorial may take is shown in the architect's drawing for the proposed Greek Theater as a memorial to the soldiers of Santa Monica, California. This memorial will be unique among structures of similar kind in this country says the Los Angeles Times. It will be in the form of a magnificent Greek theater, and in addition to being a lasting monument to that city's gallant service men it will have an educational value of recognized importance. H. M. Rebo, superintendent of the Santa Monica schools, originated the plan, which has the hearty indorsement of the school authorities. Huntington Park, Long Island, will commemorate the brave soldiers and sailors who died in the war by erecting in City Hall Park a memorial fountain designed by Burt W. Johnson, the sculptor, and Myron Hunt, the architect. A drawing of it is reproduced below. In giving the proper setting of memorial trees to a memorial Mr. Johnson writes *American Forestry*: "In a memorial forest erect small but permanent and beautiful monuments. Two ideals could be expressed. The trees and birds of symbols of the beautiful things in life. The other idea would be to illustrate the material contribution of the forests toward winning the war."



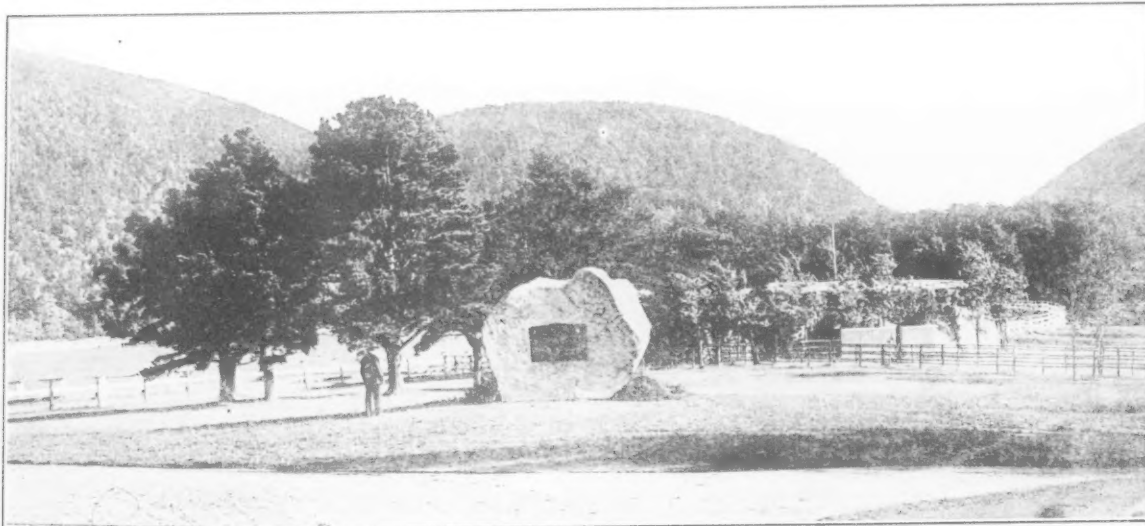
THE BIRCH ROAD AT BETHLEHEM, N. H.



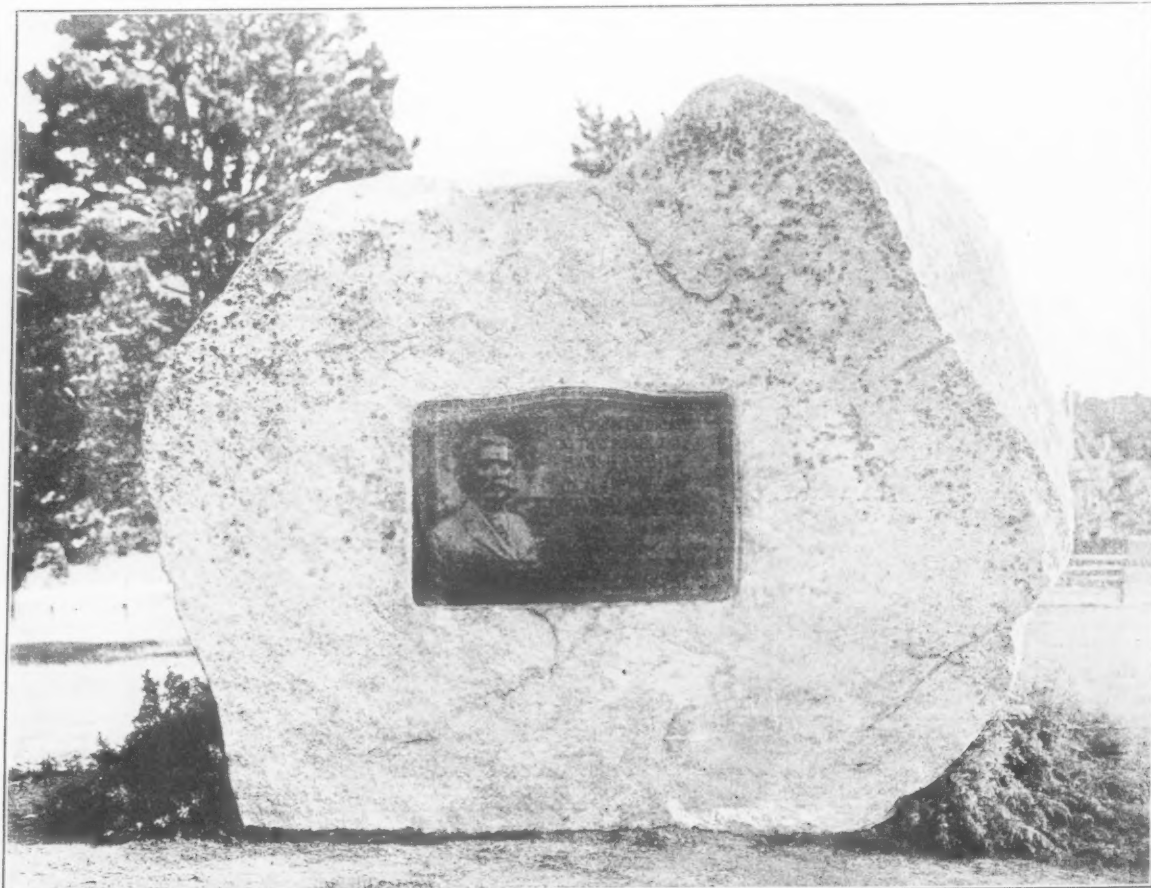
Underwood and Underwood

The value of birch for "Roads of Remembrance" is that their color aids in following the road at night. This drive is widely known and shows what a heritage can be left for the future in the road side tree planting, which has been taken up so widely throughout the country.

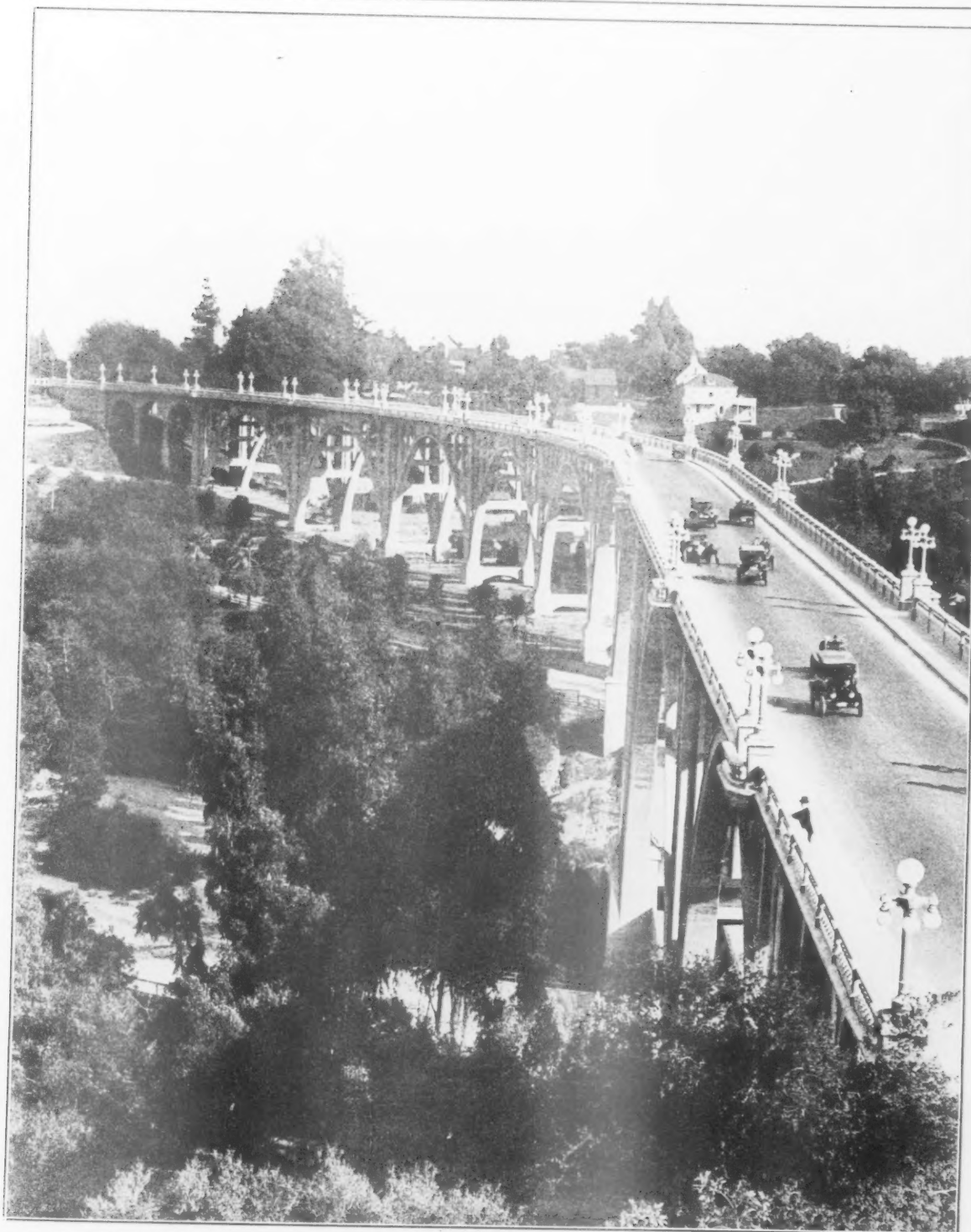
MORRELL PARK FOR THE PEOPLE



In memory of General Edward de V. Morrell the park at Bar Harbor, Maine, has been dedicated to the people by Mrs. Louise Drexel Morrell, of Philadelphia, and a boulder, weighing more than fifty tons, appropriately marked, has been placed at the entrance of the park. The portrait on the boulder is by Allen F. Newman. The bronze was executed by the John Williams Company. On behalf of the Board of Trustees, T. DeWitt Cuyler, of New York, accepted the gift for the people of Bar Harbor. Judge Deasy introduced Bishop Walsn, of Maine, who presented the deed to Mr. Cuyler. There are two tracts in the park totaling about 60 acres. Many improvements had been made in the acreage and the action on the part of Mrs. Morrell is but an example of what fine things can be done in the way of memorializing an individual with parks and trees. It is such memorials that will stand for all time and they should be approached by "Roads of Remembrance" making them easy of access by the residents of a locality or by visitors.



MEMORIAL BRIDGES PLEASE THE EYE



Underwood and Underwood

In the building of "Roads of Remembrance" memorial bridges could well have a part in the program for honoring our war heroes. As suggested by the American Forestry Association, avenues of memorial trees should be the proper approach to such structures such as this at Pasadena.

HOW VINELAND HONORS HER HEROES.



One of the most unique memorial tree settings in the country is at Vineland, New Jersey. The memorial spot is the center of a forty acre tract. The trees have all been registered with the American Forestry Association. There is a circle of forty old tulip trees, seventy feet high. This circle is nearly a thousand feet in circumference. It is planted with tulip trees. Four streets extending from different sections of the city intersect with a circular driveway outside the coping. This is a natural setting which Vineland was fortunate in having had by systematic tree planting and parking fifty years ago. Within this circle the memorial was built. Twenty-two evergreen trees, Koster Blue Spruce and Douglas Fir were planted alternately in an inner circle, each tree personifying a soldier or sailor who gave his life in the World War. Each tree is designated by a granite marker fourteen inches wide and eighteen inches long and twenty inches high. A bronze plate attached to the beveled top of the marker bears the name, age, and data relative to the army or naval service, and place and date of death of each soldier and sailor.

A cement walk runs around the circle close to the markers. From this walk the inscriptions may be read. Cement walks lead from the four entrances to the center where there is a flower bed fifteen feet in diameter. At the south entrance there is a granite stone seven feet high, bearing the dedicatory inscription in bronze.

The memorial was designed by Wilbur H. Fenton, City Florist, and was built under the personal supervision of Walter H. Blake, President of the City Beautiful Committee, into whose keeping the memorial has been placed by the city officials for preservation. The scheme was financed by popular subscriptions by the Diamond Social Club, and so universal was the response for funds, that the whole community feels a personal interest in it. The cost was less than five thousand dollars.

Visitors from twenty different states have all said that it is unlike any other memorial, and prettier than any they have seen. Vineland is therefore proud of the evident fact that it has the most unique and beautiful of tree memorials.

AFTER FIFTY YEARS AT SWARTHMORE



Miss Susan Cunningham, a member of the faculty when the college was founded, plants an oak tree; and below Isaac H. Clothier, with his son Morris L. Clothier and President Joseph Swain, places a tree.



Courtesy of the Philadelphia Inquirer

In costumes of long ago students at Swarthmore College rehearse the founding exercises which marked the opening of the school fifty years ago. Memorial tree planting had a big part in the program. Miss Cunningham taught mathematics to Governor Sprout and A. Mitchell Palmer, now attorney general of the United States. She is the only living teacher of the original faculty and, with the elder Mr. Clothier, saw Lucretia Mott and her son plant two oaks marking the founding of the school fifty years ago. Swarthmore sets a fine example to other educational institutions of the country in memorial tree planting.

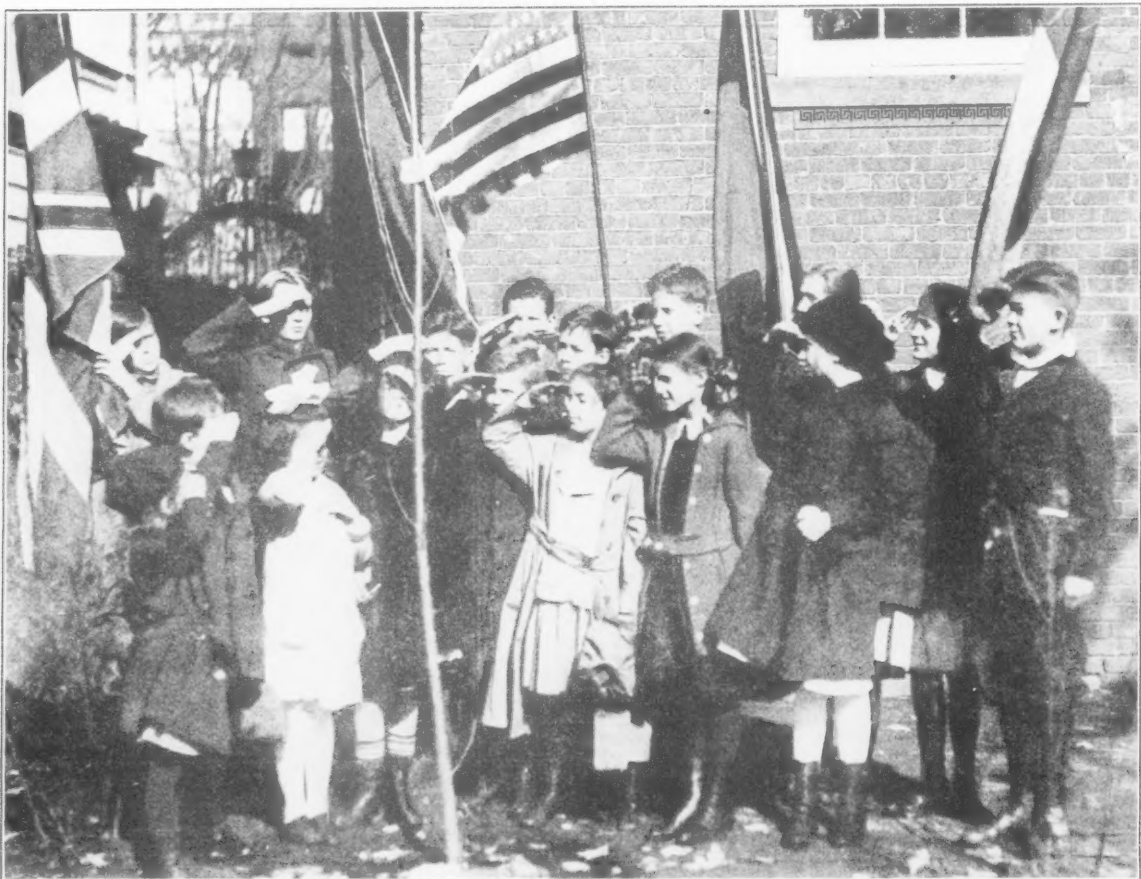
A TREE FOR QUENTIN ROOSEVELT

In a pouring rain the pupils of Force School, Washington, D. C., which Quentin Roosevelt attended when he lived in the White House, planted a Lombardy Poplar in his memory on Armistice Day. At the left is Gordon Minnegorode, of the eighth grade, who spoke of Roosevelt's life from school days to entering the army. Just to the right of the tree is B. W. Murch, supervising principal of the school, who was there when Quentin attended. In the overcoat at the right is



Captain Harry Semmes, of the Tank Corps, and a graduate of Force School, also spoke. As far as known Lieutenant Roosevelt was the only Force graduate to lose his life in the war.

In the lower picture is Henry Wilson whose father, Admiral Henry Wilson, was in command of the American Naval Base at Brest, and he lent the school the American and French flags which waved over his headquarters in France for the tree planting.



Underwood and Underwood

This committee of pupils of the Force School comprise the first self-perpetuating memorial tree committee in any school in the United States. Miss Janet McWilliam, the principal appointed a pupil from each class a member of the committee. This pupil upon passing to the next grade or out of the school appoints a member of the committee for the class the pupil is leaving. Thus as long as the tree and Force School exist there will be a Quentin Roosevelt Memorial Tree Committee at Force School. The members with their grades are: Dorothy Harrison, 1B; Lindsay Payson, 2B; Mary Church, 3B; Nancy Fair, 4A; Nell Tysen, 4B; Virginia Douglas, 5A; Burke Edwards, 5B; Alice Spaulding, 6A; George Wales, 6B; Earl Moser, 7A; Frank Norris, 7B; and Oliver Gasch, 8A.

MEMORIAL TREES IN 1920
SERVICE STAR LEGION PLANTS TREES

1551



Upper Photograph by Leafold Lower Photograph by Bradley
Fifty memorial oaks were planted in Baltimore when the Service Star Legion women met in convention. Plans are now under way for memorial tree planting by every chapter. In the picture from left to right are Mrs. T. Parkin Scott, Madame Jusserand, J. J. Jusserand, the French ambassador, Mrs. J. Barry Mahool, Mrs. Robert Carlton Morris, of Toledo, Ohio, president of the Service Star Legion, Mayor Broening, of Baltimore, and Governor Harrington, of Maryland. Mrs. Morris is now working out plans whereby every tree planted will be registered on the American Forestry honor roll.

AMERICAN FORESTRY

PERSHING PLANTS ARMISTICE TREE



Underwood and Underwood

General Pershing planted a Redwood in Lafayette Park opposite the White House on Armistice Day.



The Hill School at Pottstown, Pennsylvania, planted a memorial tree in honor of her sons when the corner stone of a new building was placed last month by Newton D. Baker, the Secretary of War. In the picture are: Dwight R. Meigs, '02; Archibald M. Thomson, '19; Percival T. Gates, '17; George P. Berry, '17; M. Herbert Bowman, '02; Kenneth Howard, '09; Harold B. Hoskins, '13; Koswell Miller, Jr., '14; W. Reginald Wheeler, '07; H. Lawrence Schilles, '08; Archibald Dudgeon, '14; Montgomery Blair, Jr., '17; William S. Crawson, '85; Joseph Buffington, Jr., '14; Seward B. Collins, '17; James McD. Clawson, ex-'19; George W. Hitner, '98. These men all answered their country's call to service and several won decorations.

STEADY "WAKE 'EM UP" BARRAGE

THE TRIBUNE CALLS FOR ACTION

UNDER the heading "Factories Peril Own Lives With Trees They Kill," the *Chicago Tribune* takes up the campaign of the American Forestry Association for a national forest policy. The *Tribune* bases its drive on a purely business argument and warns the industries of the Middle West in the following language:

"Approximately a fifth of the manufactories of Illinois, Indiana, and Ohio depend on wood for their running.

"In from ten to twenty years, at the present rate of unregulated cutting, unattended as it is by any systematic replanting, the lumber from the South will be exhausted.

"Then the Pacific Coast will be good for forty years, but it will be too expensive for the purposes of our factories to ship timber so far. Hence the factories will either succumb or be moved into the Pacific area. In either case we shall lose them.

"In these three states of Illinois, Indiana, and Ohio there is a great deal of soil that should not be farmed, if it is, because that soil is so poor that it does not pay the farmer a fair return for extraordinary severe effort.

"Some specialists estimate this unprofitable area at one-sixth of the total area of the three states. This estimate probably is excessive.

"On many of these farms people do manage to eke out an existence, but it is a growing economic waste to have generation after generation continue the struggle.

"But trees don't need so much humus as grains and grasses do. Trees are a mineral feeding proposition.

"You can grow good trees where you cannot grow good barley.

"Not dabbling in prophecy, but considering the foregoing facts, the state and county forests of Illinois, Indiana, and Ohio have formed, on the initiative of Ranson E. Kennicott, chief forester of the Cook County Forest Preserve, the Central States Forestry Association.

"The new organization hopes to hold its first meeting in Chicago next April.

"Its object is to formulate a tri-state forestry policy and urge upon the state governments the necessity of extreme measures of forestation and reforestation, and the

establishment of a system of restricted cutting that shall be in some proportion to the amount of replanting.

"The estimate of some members of the association, notably Mr. Kennicott, is that the three states could profitably put something like a seventh of their area into commercial forestry.

"The association bases its campaign on both the natural and the commercial advantages to be derived from a liberal policy of reforestation.

"First, the trees are needed to conserve moisture and prevent erosion, which is progressing in late years at an alarming rate.

"Second, the three commonwealths cannot retain their wood-using industries if they don't provide the wood for them.

"State authority and state aid in reforestation will be asked because private capital is not going to go into a proposition that looks as far forward as forty to sixty years for the richest part of the return. It's got to be the state.

"On the other hand, reasonably prompt returns are not excluded if the system of forest management be comprehensive.

"If you have absolutely to reforest bare land it will be about forty years before you can get a steady income from it.

"But from second growth and coppice areas, if treated scientifically, you can get a revenue in ten years.

"The first thing you get out, by a scientific treatment, is eight-inch ties. And if you treat a hickory forest right you get your revenue just as soon as you can cut ax handles. Five-inch hickory gives four ax handles.

"Here is an important point: There has been a kind of superstition among foresters that not more than \$10 an acre ought to be paid for forest land for commercial cutting, but that tradition is outdated now by the fact that the cost of most varieties of lumber has tripled in the last ten years.

"Only science and authority make prompt commercial cutting possible in reforested areas.

"Think, wood workers, what the newspapers are up against in the matter of wood pulp, and ponder your case."

LIKE the fabled Johnny Appleseed, who went from town to town, planting as he went, Charles Lathrop Pack, president of the American Forestry Association, is going up and down the country advocating the planting of trees, hammering day and night on the need of a national forestry policy. The demand for Memorial Avenues, Roads of Remembrance, Victory Boulevards, all planted with trees in honor of the men who

gave their lives for their country, is meeting with a remarkable response. Women's clubs, churches, rotary clubs, kiwanis clubs, patriotic societies and individuals are planting trees in rows, groups and groves.—*Pittsburgh Post*.

The American Forestry Association is urging the planting of memorial trees and creating "Roads of Remembrance," as a

simple and effective way of bringing the great principle of reforestation before the public mind and keeping it there. To interest the people in trees is the first step in the process of establishing such automatic recognition of the value and need of a national forest policy as shall be effective to save wide areas of country from climatic calamity, create great wealth in timberland, and avoid the present serious loss by

EDITORS FOR NATIONAL FOREST POLICY

fires. The foresters have hit upon an excellent idea: to plant trees as memorials of distinguished men has an appeal which is of genuine service to all the people as well as carrying a romantic tradition of enduring strength in the national character. Mr. Charles L. Pack, the president of the American Forestry Association, urges the planting of trees in all parts of the country as memorials to Theodore Roosevelt at this time of general commemoration of his birthday; recalling Roosevelt's strong interest in the subject, Mr. Pack says: "I do not believe the human mind can devise a more suitable memorial to Theodore Roosevelt than a movement which will look to preserving the forests of the country."

The foresters point out that the forests are like a bank account; they cannot be continually drawn upon without making some deposits. A national forest policy is a need which cannot be gainsaid; it is not a project for the benefit of the lumberman or the paper-maker or the wood-worker alone; it is in the interest of the whole population.—*New York Evening Sun.*

The American Forestry Association points out that the demands of France and Belgium may double the call for American lumber. Three and a half billion board feet of logs and lumber were exported annually before the war; seven billion may be needed now. In 1918 the fire loss was \$28,500,000, not much if one is thinking in billions, but a good deal from any other point of view. The acreage figures are more impressive: Eight billion four hundred million acres were burned over. The layman can do little to increase the stock of trees. But he can do a good deal, especially at this time of year, to save what we have. He can be careful with his camp fires, whether he thinks the ranger will catch him or not, can watch where his matches and cigarette stubs go, and can teach the gospel of fire caution to other people. The forests of

California are not ours alone; they belong to the nation.—*San Francisco Call.*

The coal miners' strike has brought vividly to the public comprehension how dependent the country is on the coal supply. Wood is the only practical substitute for coal, and wood can be produced in unlimited quantities. Forests have been for

pulp out of which print paper is made is consuming the growth of thousands of acres of forests annually.

Without regard to fuel, a wood famine would be almost as great a calamity as a coal famine, and it should be provided against.—*Nashville Banner.*

Great Britain has determined to spend \$17,000,000 in a ten-year campaign to replant as forest areas 250,000 acres of land to replace timber used during the war in France.

The United States could do no better than to follow the example of Great Britain and determine at once upon a broad plan for reforestation. Thus far the lumbering industry in this country has been one big problem in subtraction. If the nation does not begin to add and multiply before long, the only possible answer will be zero.—*Athens, Ohio, Messenger.*

It is gratifying to note that there is considerable interest in tree planting in Peoria at this time. No little of this interest is due to the campaign of the American Forestry Association which is attempting to get people to "plant a tree in America for every tree destroyed during the war." The forestry men are specially alert in their efforts to get trees planted along roads and public driveways—thus putting to practical use much land that has been bearing little except weeds in the decades gone by.—*Peoria, Illinois Journal.*

With thousands more interested in trees, thousands more will be interested in the ways and wherefores of forest policy.—*Minneapolis News.*

The president of the American Forestry Association of Washington has issued a call to the people to beautify their highways as memorials to the men who fought for world freedom. Good roads and tree planting go hand in hand.—*Elkins, West Virginia, Inter-Mountain.*

EVEN A COAL STRIKE MAY HAVE SOME BENEFICIAL EFFECT IF IT LASTS LONG ENOUGH



Copyrighted 1919 by the New York Tribune, Inc.

This cartoon by Darling points forcibly to the value of a woodlot regardless of whether we have coal strikes or not.

centuries systematically conserved in Europe, and we must emulate and improve on the European example. And it is not because alone of the possibility of an exhausted coal supply that a production of wood is needed. There is an insatiate and increasing demand for lumber that can't be met after awhile if the forests are not replenished, and the demand for wood

STATE NEWS

CALIFORNIA

THE number of fires and the damage resulting in the area covered by the Weeks Law agreement in California during the 1919 fire season conclusively shows the necessity of increased co-operation under this law.

An appropriation, made by the California Legislature for fire protection work, became available July 22 and on July 25 four Weeks Law patrolmen were appointed by the State Forester and took up the task of preventing and combating fires. Approximately three million acres of the Sierra Nevada watersheds in Northern California were thus, for the first time, brought under protection.

The district assigned to each patrolman was large, too large in fact, to permit the effective patrol work that is necessary. The area placed under protection is one of great fire hazard due to climatic condition. At the same time its value as a watershed is immeasurable.

One hundred and sixteen fires occurred in the protected area during the eighty-two days of the fire season that remained after the appointment of the Weeks Law men.

Several of the fires, had they not been systematically fought, would have swept from the foothills into the National Forests.

Residents of the districts in which fires occurred expressed great satisfaction with the assistance given them to combat flames that threatened their property. Several landowners expressed a desire to aid financially the work of the fire patrolmen. In one county the Supervisors, wishing to do their share toward protecting property in the county, voted to pay bills for food required by fire fighters called by patrolmen.

Sentiment in favor of fire protection work was greatly increased in the counties in which Weeks Law men worked. While the men were kept busy much of the time with fire fighting they still found time in which to organize voluntary fire fighting companies, arrange for the placement of county equipment in districts of fire hazard and at all times they preached the gospel of fire prevention.

The fire season just closed has been one of the most serious on record in California, owing to a succession of dry seasons and the presence, during the fire season, of extremely high winds. It makes one shudder to think what would have been the result in the Sierra foothills during the recent summer months had there been no fire protection work. As it is the fire-blackened district is far too large and additional co-operation under the Weeks Law as well as increased appropriations by

the state are necessary if the ravages of fire in the foothills of the Sierras are to be stopped.

IDAHO

IN accord with almost unanimous sentiment in Idaho and in response to considerations vitally affecting adjoining National Forests, Congress has set apart 1,116,000 acres of land in Idaho known as the Thunder Mountain region, as National Forest lands. This great tract, difficult of access and having not over one per cent of its area suitable for agriculture, has for years been the scene of destructive fires and devastation due to overgrazing. It is now to be added to the Payette National Forest which adjoins it on the south and west, and the Idaho National Forest which adjoins it on the north and west. The area lies approximately 100 miles northeast of Boise. Because uncontrolled, it has been a recurring menace to the adjoining National Forests by reason of fires that have gained great headway in its vast unpatrolled regions.

IOWA

A REPRESENTATIVE of the Forest Service who recently visited Iowa calls attention to the fact that there is still a considerable area of timberlands in the State. The value of these lands has been only partially appreciated, according to the forester. Three-quarters of the Nation's timberland is privately owned, while but one-quarter is Government owned, and consequently it is in the privately owned forests, as well as the others, that conservation must be practiced. To avoid an increasingly serious timber shortage, it is essential that all of these lands be properly handled to produce timber and other forest products.

Because of the present high price of lumber the timber resources of Iowa have assumed an importance entirely unlooked for a few years ago. The representative of the Forest Service declared that there is a good opportunity for farmers of southeastern Iowa, particularly, to make use of their nonagricultural lands and the islands of the Mississippi by planting quick-growing trees, such as cottonwood. He also urged farmers to use small corners of their farms for this purpose.

MAINE

THE Legislature of 1919, by making an appropriation of \$5000.00 for the year 1919 and \$10,000.00 for the year 1920, for purchase of lands and general forestry purposes, made it possible for the State Forestry Department to start two new pro-

jects, namely, Forest Fire Protection and Slash Disposal in Organized Towns. Prior to this year, the organized towns with a forest area of about 4,500,000 acres never had any fire protection of any kind; while the unorganized towns (so called wild lands) are protected by a good sized appropriation and a good organization of Chief Wardens, Deputy Wardens, Watchmen, and Patrolmen. The present forest law makes the selection of each organized town Forest Fire Wardens of their respective towns, but does not provide for any funds either to protect the forests or fight fires. Without funds these Forest Fire Wardens are almost helpless. By the passage of the above named appropriation it gave the State Forestry Department a chance to start some forest protection in organized towns. Two steel lookout towers were erected, one on Agamenticus Mountain in the town of York and the other on Ossipee Mountain in the town of Waterboro, both in the County of York. These towers are located in the heart of the best white pine section of the State of Maine and are equipped with telephone communication with the Selectmen of the towns covered by these places, panoramic maps, binoculars, and range finders. The department contemplates establishing two more stations, one in the town of Denmark and the other in the town of Parsonsfield. The view from these two stations will reach the view from the nearest station in the Maine Forestry District which is located in the unorganized town of Grafton.

MONTANA

ONE billion feet of timber killed by 1445 fires is the estimate given for Montana's tremendous forest fire losses for the season just closed. Half of the fires were started by human agency and were preventable. The fires burned over 570,000 acres of land and were suppressed at a cost of \$1,200,000, according to figures compiled by the forestry office at Missoula.

A district logging engineer with headquarters at Missoula reports that he has seen cedar trees more than 2000 years old, still alive and growing in the Kaniksu forest which is in the extreme northeastern corner of Washington. "These trees," says the engineer, "varied in size from a foot to ten feet in diameter. I used a boring instrument on them and found that the trees were in all cases 2000 years old and some of them nearly 3000. The wood is firm and is a potential source of high grade timber. I know of no place in the United States, except the redwood forests, where trees of that age may be found."

NEW JERSEY

New Jersey has been extremely fortunate with regard to fire losses during the past summer and fall, in comparison with other sections of the country. The excessive rainfall has almost prevented fires from starting. From August 1st until the middle of November there have been less than ten fires in the entire state, and all of these have been trifling. For this period the total has usually been from 150 to 300. Last year during the four months there were 152 fires, while the year before there were 241.

The three year terms of most of the local firewardens within the state expire at the end of the year. The freedom from fires has enabled the staff to devote much of its energy to the reorganization and strengthening of this field force. The dead wood is being replaced by good timber, and special efforts are being made to insure that wardens who have displayed ability are reappointed.

The withdrawal of one of the division wardens from the Forest Fire Service to take up educational work brings about the first change in the staff of the state organization.

NEW YORK

THAT America can produce better forests than nature has given us, under right application of forestry was the declaration of Dr. Hugh P. Baker, Dean of the New York State College of Forestry at Syracuse before the American Paper and Pulp association in convention at New York, when the nation's paper makers asked him to discuss the report of their committee on forestry. He said: "The long growing Adirondack and other forests today not aided by man, may be growing at the rate of 200 board feet per year. The Black Forest, and other forest areas of Europe, not as well adapted to forest growth as very much of the forest area of this country, before the war were producing more than a thousand board feet per acre per year, and at the same time conserving water more effectively, were better places for fish and game, and were as effective as man can make a forest for recreational purposes.

"The difficult coal situation which has been before the public and our national government is educating the people in this country to the point where it is barely possible that the public may force the maintaining of productivity of forest lands as it looks as if the government may force the productivity from coal mines. It will be much better if the forest industries will solve these problems themselves by providing unity of action rather than to be forced into an awkward situation by what seems to be public welfare.

"New York probably leads the states of the union in the reforestation of forest lands. Great credit is due the State Con-

servation Commission for the aggressive way in which it has carried on reforestation. What they are doing, however, is but a drop in the bucket. What is the reforestation of three or four thousand acres when the State alone owns hundreds of thousand of acres which must be partially or wholly reforested before they can be put into profitable condition. The state should bond itself, if necessary, to protect and encourage the forest industries of the state as has been done for better highways and a great barge canal. There should be inducements held out to the owners of agricultural land to get better farm crops. Forestry is second in importance to agriculture as a fundamental to the life of a nation."

Uncle Sam has given formal recognition to the State Ranger School of the New York State College of Forestry at Syracuse, by sending to the school four of his wounded soldiers, and by preparing to send others from all parts of the United States. While going to school they are being paid \$80 a month from the government. The Federal Board of Vocational Training has particularly been interested in the opportunity for building back into profitable occupations those soldiers whose lungs were torn by gas, or who were injured in battle, by sending them into the big out-of-doors where they can be trained for service which gives them an open air life.

OREGON

AT a meeting of forest protective agencies held at Klamath Falls, Oregon, October 21, and 22, 1919, representatives of the United States Forest Service, State Forest Service of Oregon, Klamath Indian Service, Crater National Park, Oregon Agricultural College, Western Forestry and Conservation Association and Klamath-Lake Counties Forest Fire Association being present the following resolutions were unanimously adopted:

In view of the importance of the forest industry in the State of Oregon and the large percentage of the taxes of the State paid by said industry, and since insect depredations in the timber are in certain localities a decided menace, we feel that greater attention should be given to forest entomology in the state. We, therefore urge the Oregon Agricultural College to build up a strong department of Forest Entomology and through such department lend assistance to owners of timber in the state in control of insect depredations.

In view of the serious fires which occurred in Oregon the past season and the expense involved in fighting said fires, it is apparent that the appropriation for protection of Oregon and California Grant Lands will not be sufficient to pay the pro rata share of cost of protection of said lands. We, therefore urge upon our Congressional delegation that they use every

effort to see that \$15,000.00 additional be provided for protection of these lands the current fiscal year.

In view of the yearly damage to timber (particularly yellow pine) resulting from insect depredations, and the imperative need of perfecting methods for the control of said depredations, we earnestly request the United States Forest Service to increase its personnel in Oregon for such work and further ask that the service cooperate with and extend assistance to private owners in the State of Oregon looking to more efficient insect control.

Whereas, the grazing areas in the State of Oregon are being reduced yearly owing to homestead occupation, reproduction of forests, etc., a growing congestion on the ranges seriously threatens the live stock industry unless some federal regulation is provided on all public lands; and

Whereas, there are over three million acres in the Oregon and California Land Grant, more or less of which will provide feed for live stock pending disposal under the public land laws;

Resolved, that we respectfully urge the Department of the Interior to adopt and put into effect a policy of leasing the grazing privileges on these Oregon and California Lands to live stock growers, and that the proceeds be used to increase the present appropriation for the protection of said lands from forest fire.

Whereas, there are located in Deschutes, Klamath and Lake Counties, State of Oregon approximately 83,000 acres of land being administered by the Interior Department of the United States Government on which is growing more or less lodgepole pine of little commercial value, but which constitutes an extremely bad fire menace to adjoining National Forest Lands and lands belonging to private individuals or companies on which is growing a stand of commercial yellow pine timber, and as our state laws require the private owners to provide an adequate fire patrol to prevent loss from forest fires, and to do so it has been necessary in the past for said owners to patrol and fight fires upon the Interior Department lands for the protection of their own interests;

Therefore, we urge upon our representatives in Congress the necessity for an appropriation of not less than \$5000.00 per annum to be used for the protection of these lands; and we urgently request the Secretary of the Interior to make request for this amount of money for the above purposes in his next annual budget.

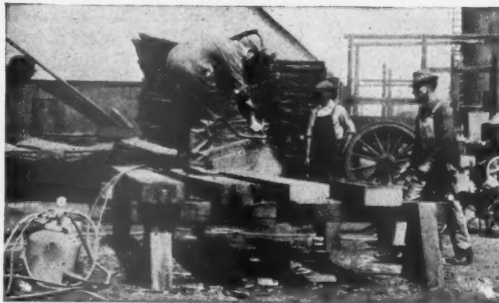
WISCONSIN

THE Forest Products Laboratory, at Madison, has prepared a list of government and state bulletins of value to woodlot owners who wish to market their products. This list will be furnished by the laboratory to anyone upon request.



Replacement of porch columns and joists in framing of three floors is an annual occurrence at most apartment houses of this type.

Arrows point to a badly rotted column on the third floor, to a new column just put in on the second floor, and on the walk to rotted columns and stringers already taken down.



Applying surface treatment by spraying Carbosota on contact surfaces.

The Dangers of Decay

Wooden back porches and stairs of apartment buildings, factories, warehouses, and other industrial structures must be protected against decay to avoid becoming a serious menace to tenants, employees, and the public; likewise to reduce the continual expense of replacement, piece by piece.



The grade of lumber generally employed and the nature of the exposure, cause rapid development of decay and unsuspected weakening of the structure, particularly at points of contact.

It is, perhaps, a very small detail—to protect these structures from premature decay, but a precaution that the builder should encourage from the standpoint of safety and economy. Elimination of decay is physical protection to all, children and adults alike.

Carbosota Creosote Oil, properly applied to points of contact before erection, will retard decay and materially increase the life of even the cheapest lumber.

Used as a stain, it gives the structure a practical and attractive dark brown color at considerably lower cost than paint.

Carbosota Creosote Oil is a pure refined coal-tar creosote, standardized for non-pressure treatments.

Wood Preservation is a "Safety-First" measure.

(Green wood cannot be effectively creosoted by non-pressure processes. It should be air-dry. In regions of moist, warm climate, wood of some species may start to decay before it can be air-dried. Exceptions should be made in such cases and treatment modified accordingly.)

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CANADIAN DEPARTMENT

BY ELLWOOD WILSON

PRESIDENT, CANADIAN SOCIETY OF FOREST ENGINEERS

THE advisory committee which was asked for by the Minister of Lands and Forests of Quebec to discuss with his Chief Forester a revision of the cutting regulations and also the future forest policy of the Province, held its first meeting in Quebec City and after a very interesting discussion agreed to certain recommendations to the Minister. The most important of these was that there be appointed a committee which should represent the lumber and pulp interests, the settlers' interests, and forestry and that this committee should act in an advisory capacity to the Minister of Lands and Forests and his Department in framing regulations for the use and perpetuation of the forests. It is hoped that if this suggestion is adopted most of the present causes of friction between the lumber interests and the settlers can be eliminated.

The forest fire situation in New Brunswick during the past season was better than in the previous year. So many fires were due to carelessness that October ninth was adopted as "Fire Prevention Day" throughout Canada to try and impress on people the necessity for care in preventing all kinds of fires. The total number of fires in New Brunswick's forests for the season were 342—70 per cent set by railroads causing 3.5 per cent of the damage; 7 per cent set by campers causing 31.7 per cent of the damage; 11.5 per cent set by settlers causing 44.1 per cent of the damage; 3.5 per cent set by operators causing 7.1 per cent of the damage; 8 per cent set by accidental and incendiary causing 13 per cent of the damage. Most of the fires occurred in May and June. The above shows that campers and settlers were the chief contributing causes. Eighteen square miles were burnt with a loss of \$154,155. Thirty-six prosecutions were instituted with 29 convictions. About 70 miles of telephone lines were built co-operatively by the Government and the Bathurst Lumber Company and forty more miles will be built to connect with a lookout station. Twenty-six returned soldiers were employed. Four hundred and ninety acres of land belonging to the Bathurst Lumber Company have been set aside as a forest reserve and experimental cuttings are taking place under a plan worked out by Dr. Howe and in immediate charge of Forester W. M. Robertson.

The same kind of work is being done under the supervision of Mr. R. W. Lyons on the Vermillion Limit of the Laurentide

Company, Ltd. The Department of Lands and Forests has been asked to set aside these experimental areas as forest reserves.

The fire season in Quebec has been, from the standpoint of weather, the worst in several years, but the number of fires was not large. Contrary to the experience in New Brunswick, practically no difficulty was had with settlers. The worst fires were caused by dam-keepers and river-drivers of the operators. This is a most curious situation, as these operators are paying the cost of fire protection and are hiring the fire rangers, so that they are not only destroying their own property but it is being done by their own employees. Of course the answer is the lack of an appreciation of the necessity of preventing forest fires on the part of some of the managers of woods operations and their failure to enforce the rules of their departments. Often the sub-managers and higher foremen feel that the fire protection work, in some way, takes away from their authority and interferes with their work, and then too, sometimes they are afraid their men may leave if they are particular about enforcing the fire regulations. The situation is serious and heads of companies should insist that their own men are controlled and not allowed to set forest fires.

Mr. S. L. de Carteret, Forester for the Brown Corporation, will now be in charge of all the timberlands of the Brown Corporation, with headquarters in Quebec City. Mr. de Carteret was, for several years, engaged in working up a scheme for timberland insurance, which he handled very successfully.

Mr. L. A. Nix, graduate of Syracuse University, sometime with the U. S. Forest Service, and who served during the war in the Chemical Division at Edgewood Arsenal, Baltimore, has resigned from the staff of the Forestry Department of the St. Maurice Paper Company and returned to the Laurentide Company for whom he worked before enlisting.

A very interesting article on the work of the Forestry Department of Syracuse University, appears in the Royal Spanish Society of the Friends of Trees.

The Canadian Export Paper Company, Ltd., of Montreal, is sending Mr. W. G. Mitchell abroad to make a study of conditions in the Pulp and Paper Industry in Scandinavia, Finland and Russia.

The Aviation Branch of the St. Maurice Forest Protective Association has completed its work for the season and the planes loaned by the Government will be thoroughly overhauled and put in condition for further experimental work next season. Four hundred pictures 8x10 inches, covering 4,000x3,200 feet each, were taken at an altitude of 5,000 feet. The pictures show all kinds of country, settled, villages, swamps, burns, cut-over, regenerating naturally, planted and all sorts of timber types. Those so far developed and printed exceed all expectations and it is confidently felt that aerial photography will revolutionize timber mapping. The accuracy with which areas in various types, burns, water and so forth can be measured, drainage basins determined and topography studied will add much to the value of the work. Those wishing to buy timberlands, or banks, or other corporations loaning money on timberlands can now be sure of what they are getting for their money.

Alarm is now being felt in Queensland at the very rapid depletion of available timber supplies, particularly softwoods. The Forestry Service is now facing the heavy responsibility of attempting to make good the deliberate dissipation of the forest asset which has characterized the past. Forest reservations have been set aside and now total 3,700,000 acres, but the task of reforestation has been left so late that it will be many years before its effect will be felt.

In Norway it is proposed to build a tunnel to carry logs past a large dam built for water power development. This is an interesting way of solving the problem.

There is practically a complete failure of the white spruce seed crop in the east. The trees in eastern Canada have not seeded for two years and Black Hills and Norway spruce seed has had to be used. Likewise, owing to the rapidly increasing demand, the prices of nursery stock have risen tremendously.

The seaplane purchased by the Brown Corporation, one of two which will be used in mapping their timberlands, was last reported as having flown from New York to Burlington, Vermont. It is expected to arrive at its base on the St. Maurice River shortly.

The plantations made by Chief Forester G. C. Piche, of the Quebec Forest Service, on the drifting sands at Lachute and Ber-

No. 1

The Making of Southern Pine

FIRST the forest cruiser, lone explorer, and advance agent of the lumberman, judges and chooses with keen, appraising eye the prime stands of virgin woodland. A great sawmill is erected. More thousands are added to the millions of persons in America who derive their livelihood from manufacturing trees into lumber, and another thriving prosperous community is added to the five hundred maintained by producing Southern Pine—that sturdy, dependable material which still is and always has been the least expensive, most easily available building material in the world.

Southern Pine Association
New Orleans, Louisiana

This illustration is the first of a series depicting the manufacture of Southern Pine. The entire series will be published in a beautiful booklet. Send for your copy NOW.



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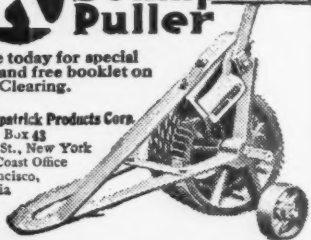
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thier some seven years ago, have made splendid progress and are now six to ten feet in height for Norway spruce and eight to ten feet for white pine. These plantations were made to stop the encroachment of the sand on farming country and have answered the purpose admirably. The growth of the spruce in absolutely pure sand is quite remarkable. It is too bad that the plantations have not been continued.

Messrs. Clyde Leavitt, J. M. Swaine and Arnold Hanssen made a trip to the limits of the River Ouelle Lumber Company at River Manie, in the company of W. G. Power, President of the Canadian Lumbermen's Association, to investigate the ravages of the spruce budworm and spruce bark beetle. They report that the trees are beginning to recover from the attack but that the number of spruce trees blown down as the result of cutting to a diameter limit is very large, causing a great deal of waste.

A course in paper-making has been started in the Laurentide Night School with

forty-five entrants. The course will begin with lectures on forestry and will be followed by others on logging, wood preparation, grinding, sulphite making, paper-making, purchasing, selling, engineering and management. One hundred and fifty pupils are enrolled for the winter session of the school.

Robson Black, Secretary of the Canadian Forestry Association, has finished a most successful lecturing trip through the Prairie Provinces. He has held ten public meetings in Winnipeg alone, sometimes at the rate of two or three per day, addressing business men, bankers, mortgage companies and so forth. In Prince Albert he had an audience of 700 men and women. Much enthusiasm for the conservation of timber resources was aroused and the idea has taken firm root. The Forestry Car which is making a tour of the country has met with the greatest success.

The reports of damage from forest fires in the Prairie Provinces during the past summer will run into millions of dollars.

FOREST SCHOOL NOTES

UNIVERSITY OF CALIFORNIA

THE Forestry Club has had three interesting meetings since October 1st. Twenty-five men left Berkeley early Sunday morning, October 5th and went by train and boat to Fairfax, for a hike through the picturesque hills of Marin County. The route of the trip was across a chaparral covered ridge to the new La Guitas reservoir of the Marin Municipal Water District. This artificial lake with its well forested watershed is now full to capacity for the first time and has added greatly to the natural beauties of the region. After following down La Guitas Creek to the junction of the Little Carson Creek a halt was made for lunch beneath the shade of some fine redwood, Douglas fir and Tanbark oak trees. The afternoon trip brought us back to Fairfax by way of the headwaters of the Little Carson. Twenty-five species of trees were noted during the day.

The next regular meeting was held on October 17th, when Professor David T. Mason spoke to the club about his work with the Treasury Department in the administration of the income tax to the lumber industry.

An open air meeting in the Berkeley Hills was held on October 28th at the old camp fire place in Telegraph Canyon. After a hearty meal of "weenies," coffee and pie, Mr. S. B. Detwiler, who is in charge of the White Pine Blister Rust eradication, told the boys something of the character of the work being done in scout-

ing for the disease and the nature of the quarantine by means of which it is hoped that it may be kept out of the western forests. Mr. Posey, who is directing the work in California and several of his field men were also guests of the forestry club at this camp fire meeting.

During the regular business session it was decided that the forestry club should recommend to the Associated Students' organization the planting of a memorial grove of Sequoia gigantea on a suitable site in Strawberry Canyon to the 80 University of California men who gave their lives in the World War. It is hoped that the work can be done as the "Labor Day" project by the entire student body on February 29, 1920. It has been the custom for several years for students and faculty to lay aside regular duties on this extra day and all join in some work of improvement of beautification needed about the campus. The forestry club feels that the planting of such a memorial grove is the most fitting way in which the coming Labor Day can be spent.

Professor Woodridge Metcalf spent a week end recently with the Santa Cruz high school forestry class which is being conducted by R. E. Burton, a former president of the University of California Forestry Club. An interesting field trip through some of the cut over lands in the vicinity of Santa Cruz was made the opportunity for pointing out the necessity for permanent forests in this region. Many

(Continued on Page 1563)

\$7,500,000**BROWN COMPANY**

(Formerly the Berlin Mills Company)

6% Serial Gold Debenture Bonds—Series "A"

AUTHORIZED \$15,000,000

OUTSTANDING \$7,500,000

Dated November 15, 1919.

Interest payable May and November 15.

Due in annual installments of \$375,000 each November 15, 1920 to 1939 inclusive.

Interest payable without deduction for any Federal Normal Income Tax up to 2%

OLD COLONY TRUST COMPANY, BOSTON, Trustee

HISTORY AND BUSINESS

The Brown Company, founded in 1852, is the largest manufacturer in this country of bleached sulphite fibre pulp and kraft wrapping paper and it also manufactures bond paper, lumber and allied products. Sales in recent years have averaged more than \$23,000,000 annually. Its operations in Canada are conducted through a subsidiary, the Brown Corporation, of Canada, of which the Brown Company owns all the capital stock.

PROPERTY

The mill properties at Berlin and Gorham, N. H., consist of two paper mills, two sulphite fibre mills, a saw-mill and five hydro-electric plants with an installed capacity of 25,000 H. P. and a steam power plant with a capacity of 20,000 H. P.

The Canadian plant consists of a pulp mill and water-power for manufacturing sulphate fibre, which product is shipped free of duty to the American plants.

A practically perpetual supply of raw material is assured by ownership in fee simple of more than 400,000 acres of timber land in Maine, New Hampshire and Vermont, and the acquisition in Canada through the Brown Corporation of more than 800,000 acres in fee simple and stumpage and about 1,700,000 acres in timber limits under perpetual license. Total holdings are over 4,530 square miles, conservatively estimated to contain 15,000,000 cords.

ASSETS

The cash investment in the American mill properties alone is over \$14,000,000.

After the application of the proceeds of these bonds the net quick assets of the Brown Company will be in excess of \$12,000,000, and the tangible assets applicable to this issue in excess of \$38,000,000.

The combined tangible assets of the affiliated companies are in excess of \$50,000,000.

EARNINGS

Earnings of the Brown Company, as certified by Messrs. Niles & Niles, Certified Public Accountants, for the last five fiscal years, after taxes, depreciation and interest have averaged \$2,190,222, or nearly five times the interest on this issue, and for the last three fiscal years have averaged \$3,102,369, or nearly seven times the interest on this issue, to which are to be added the earnings of the Brown Corporation for the last three fiscal years, averaging \$507,617.

In addition to the above earnings, special reserves have been set up by the Brown Company during the last five years averaging \$445,658, and by the Brown Corporation during the last three years averaging \$272,617.

PROVISIONS

The Indenture securing these bonds has been so drawn that no further mortgage may be placed upon the present assets while any of this issue is outstanding. The Company covenants to maintain net tangible assets of 300% of Series "A" at any time outstanding, and total tangible assets of 200% of total liabilities, so long as any bonds issued under this Indenture remain outstanding. Furthermore, the Company will maintain net quick assets, exclusive of inter-company accounts, at not less than 75% of all bonds of Series "A" and previously issued funded debt outstanding, and at not less than 50% of the total funded debt outstanding during the life of any bonds issued under this Indenture.

MATURITIES	APPROXIMATE	
	PRICE	YIELD
1920 to 1922 inclusive.....	100	6.00%
1923 and 1924.....	99½	6.15%
1925 to 1929 inclusive.....	99	6.15%
1930 to 1934 inclusive.....	98½	6.15%
1935 to 1939 inclusive.....	98	6.15%

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The statements contained herein are not guaranteed, but are based upon information which we believe to be accurate and reliable, and upon which we have acted in the purchase of these bonds.

BOOKS ON FORESTRY

AMERICAN FORESTRY will publish each month, for the benefit of those who wish books on forestry, a list of titles, authors and prices of such books. These may be ordered through the American Forestry Association, Washington, D. C. Prices are by mail or express prepaid.

FOREST VALUATION—Filbert Roth.....	\$1.50
FOREST REGULATION—Filbert Roth.....	2.00
PRACTICAL TREE REPAIR—By Elbert Peets.....	2.00
THE LUMBER INDUSTRY—By R. S. Kellogg.....	1.10
LUMBER MANUFACTURING ACCOUNTS—By Arthur F. Jones.....	2.10
FOREST VALUATION—By H. H. Chapman.....	2.50
CHINESE FOREST TREES AND TIMBER SUPPLY—By Norman Shaw.....	2.50
TREES, SHRUBS, VINES AND HERBACEOUS PERENNIALS—By John Kirkegaard.....	1.50
TREES AND SHRUBS—By Charles Sprague Sargent—Vols. I and II, 4 Parts to a Volume—Per Part.....	5.00
THE TRAINING OF A FORESTER—Gifford Pinchot.....	1.35
LUMBER AND ITS USES—R. S. Kellogg.....	1.15
THE CARE OF TREES IN LAWN, STREET AND PARK—B. E. Fernow.....	2.17
NORTH AMERICAN TREES—N. L. Britton.....	7.30
KEY TO THE TREES—Collins and Preston.....	1.50
THE FARM WOODLOT—E. G. Cheyney and J. P. Wentling.....	1.75
IDENTIFICATION OF THE ECONOMIC WOODS OF THE UNITED STATES—Samuel J. Record.....	1.75
PLANE SURVEYING—John C. Tracy.....	3.00
FOREST MENSURATION—Henry Solon Graves.....	4.00
THE ECONOMICS OF FORESTRY—B. E. Fernow.....	1.61
FIRST BOOK OF FORESTRY—Filbert Roth.....	1.10
PRACTICAL FORESTRY—A. S. Fuller.....	1.50
PRINCIPLES OF AMERICAN FORESTRY—Samuel B. Green.....	2.00
TREES IN WINTER—A. S. Blakelee and C. D. Jarvis.....	2.00
MANUAL OF THE TREES OF NORTH AMERICA (exclusive of Mexico)—Chas. Sprague Sargent.....	6.00
AMERICAN WOODS—Romeyn B. Hough, 14 Volumes, per Volume.....	7.50
HANDBOOK OF THE TREES OF THE NORTHERN U. S. AND CANADA, EAST OF THE ROCKY MOUNTAINS—Romeyn B. Hough.....	6.00
GETTING ACQUAINTED WITH THE TREES—J. Horace McFarland.....	1.75
HANDBOOK OF TIMBER PRESERVATION—Samuel M. Rowe.....	5.00
TREES OF NEW ENGLAND—L. L. Dame and Henry Brooks.....	1.50
TREES, SHRUBS AND VINES OF THE NORTHEASTERN UNITED STATES—H. E. Parkhurst.....	1.50
TREES—H. Marshall Ward.....	1.50
OUR NATIONAL PARKS—John Muir.....	1.91
LOGGING—Ralph C. Bryant.....	4.00
THE IMPORTANT TIMBER TREES OF THE UNITED STATES—S. B. Elliott.....	2.50
FORESTRY IN NEW ENGLAND—Ralph C. Hawley and Austin F. Hawes.....	3.50
THE PRINCIPLES OF HANDLING WOODLANDS—Henry Solon Graves.....	2.00
SHADE TREES IN TOWNS AND CITIES—William Solotaroff.....	3.00
THE TREE GUIDE—By Julia Ellen Rogers.....	1.00
MANUAL FOR NORTHERN WOODSMEN—Austin Cary.....	2.12
FARM FORESTRY—Alfred Akerman.....	.57
THE THEORY AND PRACTICE OF WORKING PLANS (in forest organization)—A. B. Recknagel.....	2.10
ELEMENTS OF FORESTRY—F. F. Moon and N. C. Brown.....	2.50
MECHANICAL PROPERTIES OF WOOD—Samuel J. Record.....	1.75
STUDIES OF TREES—J. J. Levison.....	1.75
TREE PRUNING—A. Des Cars.....	.65
THE PRESERVATION OF STRUCTURAL TIMBER—Howard F. Weiss.....	3.00
SEEDING AND PLANTING IN THE PRACTICE OF FORESTRY—By James W. Toumey.....	3.50
FUTURE OF FOREST TREES—By Dr. Harold Unwin.....	2.25
FIELD BOOK OF AMERICAN TREES AND SHRUBS—F. Schuyler Mathews.....	2.00
FARM FORESTRY—By John Arden Ferguson.....	1.50
THE BOOK OF FORESTRY—By Frederick F. Moon.....	2.10
OUR FIELD AND FOREST TREES—By Maud Goeing.....	1.50
HANDBOOK FOR RANGERS AND WOODSMEN—By Jay L. B. Taylor.....	2.50
THE LAND WE LIVE IN—By Overton Price.....	1.70
WOOD AND FOREST—By William Noyes.....	3.00
THE ESSENTIALS OF AMERICAN TIMBER LAW—By J. P. Kinney.....	3.00
HANDBOOK OF CLEARING AND GRUBBING, METHODS AND COST—By Halbert P. Gillette.....	2.50
FRENCH FORESTS AND FORESTRY—By Theodore S. Woolsey, Jr.....	2.50
MANUAL OF POISONOUS PLANTS—By L. H. Pammel.....	5.35
WOOD AND OTHER ORGANIC STRUCTURAL MATERIALS—Chas. H. Snow.....	5.00
EXERCISES IN FOREST MENSURATION—Winkenwerder and Clark.....	1.50
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FOREST MANAGEMENT—By A. B. Recknagel and John Bentley, Jr.....	2.50
THE FOREST RANGER AND OTHER VERSE—By John Guthrie.....	1.60
TIMBER, ITS STRENGTH, SEASONING AND GRADING—By H. S. Betts.....	3.10

* This, of course, is not a complete list, but we shall be glad to add to it any books on forestry or related subjects upon request.—EDITOR.

FORESTRY PRIZE ESSAY OFFER

A PRIZE essay on forestry is being offered by the Indiana Division of Forestry, the subject being: Private versus State Forests.

The contest is open to the pupils of both public and parochial schools. For the best essay from the seventh and eighth grades, respectively, a prize of \$5.00 will be given. For the best essay from each of the high school classes a prize of \$7.50

will be given. The offer is made to all schools doing work equivalent to the grade or high schools. The essay must not exceed 2,000 words. It must be mailed not later than May 15, 1920, to the State Forester at Indianapolis, Indiana, Room 7, State House. Contestants should write the State Forester for particulars and rules governing the contest.

BOOK REVIEWS

THRIFT AND CONSERVATION, by J. F. Chamberlain. J. B. Lippincott, Philadelphia. Price, \$1.40.

Very aptly is the President quoted in this little book, just from the Lippincott presses—"To practice thrift in peace times is a virtue and brings great benefit to the individual at all times." During the last few years, and especially since the beginning of the war, the term "thrift" has been much more in the public mind and on the public tongue than heretofore. Men and women are talking thrift and economy; children are writing essays on thrift and are earning and saving as never before. There are lectures and published plans and outlines telling how to earn and invest and save, and the authors have set forth in this book the needs for this teaching of thrift, together with many practical applications of the thrift principles to the life of the people as made possible through such teaching. The causes leading up to the spend-thrift practices of our people are set forth and the necessity for rational habits in proper saving and economy are made plain. And the distinction between true and false economy is carefully pointed out all through the book, *i. e.*, thrift does not consist in hoarding or in miserly practices. One does not save in order to have simply but in order to have that he may use wisely. He saves against the time of emergency, in his own life and those dependent upon him, and that he may do his part in community or state through the channels of public or private service. So changed is the attitude of the public mind that where formerly a man of thrift and saving tendencies was looked upon with something of contempt and pity, now the man who is not reasonably thrifty or economical is the object of more or less adverse criticism. It has at last become dignified to conserve instead of waste—to practice thrift rather than spend foolishly and we predict that this book by the Chamberlains will point the way for many who wish sincerely and intelligently to establish the habits of thrift.

The 1919 Forest Club Annual, of the College of Forestry and Lumbering, at the University of Washington, Seattle, which is just out, is full of interest and value. Its compilation reflects great credit and the organization, and editors of the Annual, are to be congratulated on the publication. A few copies are available to interested foresters and lumbermen, who may procure a copy by writing to the Secretary of the Forest Club, University of Washington, Seattle, Washington.

FOREST SCHOOL NOTES

(Continued from Page 1560)

of the thirteen boys in the class are planning to take up forestry in the University.

Professor Walter Mulford has been appointed a member of the Research Committee of the Save the Redwoods League, which organization is conducting a very active campaign for the setting aside of some of the finest bodies of redwood in Humboldt County as either National or State parks. The chairman of this committee is Meritt B. Pratt, now deputy State Forester, but formerly assistant professor of Forestry at Berkeley.

UNIVERSITY OF MONTANA

THE Forest School opened on October 1st with an enrollment of 60 students, of whom nearly half are non-residents of Montana. States represented are South Dakota, Illinois, Ohio, Iowa, California, Washington, Colorado, Connecticut, Indiana, New York, Wisconsin, Missouri, Minnesota, Nebraska, Massachusetts, South Dakota, Kansas, and Idaho. Also one student from Canada, one from New Zealand, and two from the Philippine Islands.

The Forest School counts itself very fortunate this year in having among its students Felix Franco, and Placido Decanay who are foresters from the Philippine Islands. These gentlemen are native Filipino foresters of a group of five Philippine forest officers who are being sent to schools of forestry in this country at the expense of the Philippine government. Both of these men have graduated from the government school of forestry in the Philippine Islands and have had experience as Forest Supervisors in the Philippine Forest Service.

The Forestry Club has started its series of lively meetings. Special consideration is being given this year by the members of the Forestry Club to the question of a national forest policy.

The annual meeting of officers of the Forestry Club resulted in the election of H. Whisler, a senior student, as president of the Club for the forthcoming year. R. A. Williams, William Zeh and G. M. DeJarnette, all junior students, were elected treasurer, secretary and vice-president.

Dean Skeels recently visited the annual session of the Pacific Logging Congress at Portland, Oregon, and a convention of representatives of the faculties of the schools of Forestry in the state universities of California, Oregon, Washington, Idaho and Montana. Dean Skeels has made an interesting report of the proceedings of the Logging Congress. Of especial interest to foresters of the northwest was the consideration given by the Logging Congress to conservation and forest protection prob-

lems in general and particularly to the issues which are leading towards the definition of a stronger policy of forestry for the nation.

Steps are being taken through state authorities for the acquisition of the Fort Missoula timber reservation as a working forest for the School of Forestry.

The faculty is co-operating in an important way with the Forest Service members of the Missoula branch of the Society of American Foresters in preparing a preliminary plan for such part of a national forestry policy as will apply to the intermountain region.

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Hopeful, grateful America appeals for the Red Cross spirit.

As a part in furthering a better policy of forestry Dean Skeels and Professors Spaulding, Fenska and Lansing are also preparing material for a complete report to the state authorities of Montana regarding the present forestry problems relating to state lands and looking towards improvement of the state policy for forestry matters in general.

New features for the short course for Forest Rangers which has for twelve years been held during the winter quarter of the school year will be courses of specialization in grazing and forest engineering.

NATIONAL HONOR ROLL, MEMORIAL TREES

Trees have been planted for the following and registered with the American Forestry Association, which desires to register each Memorial Tree planted in the United States. A certificate of registration will be sent to each person, corporation, club or community reporting the planting of a Memorial Tree.

WASHINGTON, D. C.

By Force School: Lieut. Quentin Roosevelt.
By Tenley School: Elmer Kidwell, Benjamin Perry, Aubrey Reed, Hart Sonneman.

MONUMENT, COLO.

By Monument Red Cross: George P. Hagedorn, William H. Freeman, Francis J. Lavuette, George A. Bougher, Rex R. Wilson.

NEW HAVEN, CONN.

By Mr. George A. Cromie: Lieut. Samuel Osborn Cromie.

MIDDLETON, GA.

By Middleton School: Hascal Carl Smith.

WARE COUNTY, GA.

By Canteen Unit, American Red Cross: James Jules Beaton, James Brown, Alvin Claude Bozeman, Eugene Campbell, Fred Capps, Claude De Witt Crumless, Norman Ernest Daniels, Erley Davis, Dellie Gilliard, Lewis Gillis, Ivey Lee Gunter, Franklin Lewis Henderson, Aaron Holt, Lewis H. Hopkins, John Kelly, Warren Thompson Kent, Archie B. Liles, L. D. Moody, Clyde Mott, James A. Pierce, Milton Worth Porter, Leon Ray, William Rogers, Wadley E. Sharpe, Ralph Smith, John Spaulding, Charles S. Walden, Lonnie James, Jefferson D. Stow, Frank Teuten, Peter Archie Thrift, Andrew Thrift, Alfred W. Turner, Dewey White, Gerald Yarborough.

CHICAGO, ILL.

By Flossmoor Country Club: Corp. James M. Frothingham.

SOUTH BEND, IND.

By Impromptu Club: Howard Urquhart Snyder.

BINGHAM, MAINE

By Kennebec Chapter, D. A. R. & Century Club: Bingham, Maine heroes.

ORLANDO, MAINE

By Richard Gott: Wm. P. Hutchins.

ANDOVER, MASS.

By Mrs. C. W. Ward: Andrew K. Dunn.

SHARON, MASS.

By Mrs. W. E. Clark: Charles R. Wilbur.

MANCELONA, MICH.

By Antrim Iron Company: Jakow Shelobodi, William Bohl, Donald May, Venerable Lamer-son, George E. Puckett.

FORT OMAHA, NEB.

United States Army Balloon School: Walter J. Sorenson, Ellsworth B. Rinehart, Albert Lewis Coldiron.

SPRING LAKE, N. J.

By Dr. and Mrs. G. D. Murray: Jane A. Delano.

WEST COLLINGSWOOD, N. J.

West Collingswood School: Theodore Roosevelt, Robert Shields.

CHAUTAUQUA, N. Y.

Chautauqua Bird and Tree Club: Grant S. Norton.

EAST HAMPTON, LONG ISLAND, NEW YORK

By Dr. H. Lawrence Dowd: Meredith L. Dowd.

SCHNEVUS, N. Y.

By Mr. Thomas Broxholm: Samuel F. S. Broxholm.

WHITESBORO, N. Y.

Men's Bible Class of First Presbyterian Church: Copie Van Hessen, Fred Lamphere, Harry Sautter.

CLEVELAND, OHIO

By Theodore Dluzyuski: Walter Dluzyuski.

COLUMBUS, OHIO

By Independent Protestant Church: Richard Ninehart, Walter Biderman.

NORTH LIMA, OHIO

By Trustees of Union Cemetery: Soldiers of Beaver Township who served in the World War.

CROSS CREEK, WASHINGTON COUNTY, PA.

By Mrs. Samuel Sturgeon: Theodore Roosevelt.

DOWNINGTON, PA.

By Frances Edge McIlvaine: Randolph Breese.

LEWISTOWN, PA.

By Miss Maggie E. Stine: Sergt. Ernest E. Stine, Paul N. Bostain.

PENBROOK, PA.

By Penbrook Community Civic Club: Boys of Penbrook District who died or were killed in Great War.

PROGRESS, PA.

By Penbrook Community Civic Club: Boys from Progress District who gave their lives in the Great War.

NASHVILLE, TENN.

By Robertson Academy: Lieut. John W. Overton.

ALEXANDRIA, VA.

By Parish Aid Society, Christ Church, which Washington attended: Sergt. Major John M. Leadbeater, Lieut. George Moncrief Anderton.

ST. ALBANS, VT.

By Woman's Club: Company B. of St. Albans, Machine Gun Company.

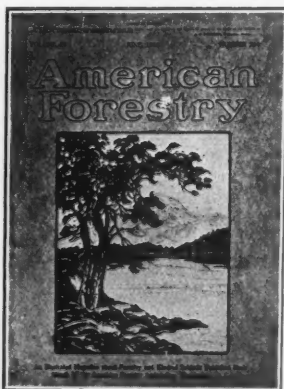
APPLETON, WIS.

Appleton High School: Edward Mach.

KOHLER, WIS.

By Village of Kohler: Soldiers and Sailors, Sheboygan County.

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UNIVERSITY OF WASHINGTON

THE College of Forestry at the University of Washington opened the first quarter of the school year with an enrollment of 135—the largest in the history of the school. Students are registered from many sections of the United States and from Chile, Siberia, Sweden, England and the Philippines.

At a recent meeting of the Forest Club, Mr. F. E. Pape, Washington State Forester, outlined the four routes for the airplane fire patrol to be instituted in this state next summer.

The Hon. Clark V. Savidge, Commissioner of Public Lands of Washington, also addressed the foresters. He brought out the surprising fact that if all the state lands of Washington were in one block they would make an area twice the size of the state of Delaware. These lands are being handled solely for the benefit of the educational institutions of the state, and the schools are now realizing the interest on sixteen million dollars derived from state lands. While no forestry other than fire protection is being practiced at the present time, Mr. Savidge is looking forward to forest management of these lands when favorable conditions for making a start have been worked out.

The Forest Club, composed of the students in the College of Forestry, has entered on what promises to be the most successful year yet experienced, and the seventy entering freshmen are showing great interest and enthusiasm in the activities of the organization. The officers for the ensuing school year are, Willis G. Corbitt, of Seattle, president; S. S. Andrews, Boulder, Colorado, vice-president, and J. Kenneth Pearce, Portland, Oregon, secretary-treasurer. Arthur K. Roberts, Tacoma, Washington, will edit the 1920 "Forest Club Annual," of which Jack Shank, Alton, Illinois, is business manager.

TRI-STATE FORESTRY CONFERENCE

A CONFERENCE of foresters of Indiana, Ohio and Illinois held at Indianapolis on October 22 and 23, and very well attended, developed particularly valuable discussion on national and state forest policies. Resolutions were adopted demanding public and legislative action to assure a permanent timber supply. Others were as follows:

Resolved, That a system of taxation on timberlands be adopted which will discourage premature and wasteful cutting and encourage forest renewal. Be it

Resolved, That the states should greatly increase their forest holdings by the purchase of young second-growth and land

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adapted to reforestation made possible by a bond issue of 50 to 100 years maturity so the burden may be equally distributed through generations. Urging that large holdings by the states will present a steady and permanent source of supply which will stabilize timber prices

Resolved, That this Conference urges upon our representatives in the Congress, the necessity for largely increased appropriations under the purchase clause of the Weeks Act, to extend the area of national forests, and particularly into the hardwood regions of West Virginia, Kentucky and Tennessee, from which the tree states concerned already draw a large portion of their hardwood supply.

Be it further urged, that the Federal Congress appropriate adequate funds for co-operation with the states in forestry, as it is doing in road building, agricultural extension, vocational education and other activities, with the especial object of encouraging farm forestry extension under the Smith-Lever Act, reforestation of idle lands and protection against fire. Be it

Resolved, That the states launch an extensive and thorough campaign through the press, the schools, the pulpit and mails, to arouse the public to the need of a state forest policy and necessity of action toward the assurance of a permanent timber supply.

It is furthermore urged, that forestry education should be made a progressive part of the public school curriculum.

THE WEEKS LAW POLICY

REPRESENTATIVE Zebulon Weaver has introduced a bill (H. R. 10372) into Congress asking for an appropriation of two million dollars a year for the next five years "to be expended under the act of March 1, 1911" (the Weeks Law), for the purchase of forest lands in the White Mountains of New England and the Southern Appalachians, with the avowed purpose of protecting the headwaters of our larger streams.

This is not a new policy, but is a continuation of a policy endorsed by Congress a number of times. The purchases began in 1911 with an appropriation of two million dollars a year for five years. As three million dollars of this was allowed to lapse, it was re-appropriated by Congress two or three years ago. Last year this policy was again endorsed, but only \$600,000 was appropriated, owing to the exceptional conditions due to the war.

The demand is now being made to put this policy on a more business-like basis by again making the expenditures cover a period of years. This has two very distinct advantages. It allows the government to compete with other possible purchasers, by allowing them to know that they will have a definite amount to spend for the next several years. It also enables the Forest Service, which is engaged in the

acquisition of the lands, to maintain a very much more effective and permanent organization of experts who are already trained in the various activities connected with purchasing.

THE SECOND SOUTHERN FORESTRY CONGRESS

THE second meeting of the Southern Forestry Congress will be held in New Orleans, Louisiana, Wednesday, Thursday and Friday, January 28, 29 and 30, 1920. It will be recalled that the first Congress was held in Asheville, North Carolina, three years ago.

It is planned to devote the first day of this meeting to a discussion of the needs of the South for forestry, with special reference to the timberland policy for privately owned lands now being proposed by the Federal Government. The United States Forester, Colonel Henry S. Graves, is expected to be present to give the views of the Forest Service on this important question, while leading men in other lines will be asked to present the subject from the points of view of the State, the lumberman and the local landowner.

On the second day a more general program will be carried out, consisting of discussions upon such subjects as the acquisition by the Federal Government of forest lands for the production of timber, as well as for the protection of streams; state forestry organizations and policies; forest fire prevention; the relation of grazing to timber production on non-agricultural lands; the future of the naval stores industry, etc. The program for the third day has not yet been outlined, but it will probably be given over to sectional meetings, or to field excursions, or both. There will be fewer set speeches than is usual at such meetings, because it is planned to develop free discussion amongst the delegates in attendance. The various forestry and lumbering associations, landowners' associations and manufacturers' associations interested in timber production and in the proper development of Southern lands are being asked to co-operate in this meeting, which it is expected will be one of the most important ever held in the South.

Colonel Joseph Hyde Pratt, Director of the North Carolina Geological and Economic Survey, Chapel Hill, N. C., is now president of the Congress, and Mr. J. S. Holmes, State Forester, Chapel Hill, is secretary. Mr. R. D. Forbes, Superintendent of Forestry, Louisiana Department of Conservation, New Orleans, has kindly consented to act as assistant secretary, and will attend to all local arrangements. It is hoped that all the Southern States will be fully represented at this Congress.

NEW FIRM OF FORESTERS

WILLIAM L. HALL has resigned his position as Assistant Forester in the United States Forest Service to head the

firm of Hall, Kellogg & Company, with offices in the Otis Building, Chicago. The firm is to deal in timberlands and forest products, make forest surveys and to develop timberland investments. Mr. Hall was with the Forest Service for twenty years. His first undertaking was the formation and organization of a definite plan for timber planting operations for the Government and assistance to private owners who desired to grow timber. After putting this work upon a sound and practical basis, Mr. Hall was next asked to develop the branch of Forest Production in the Forest Service, with which he was connected for a long time and during which period the present widely known researches and investigations in timber testing, timber treating, and pulp and paper making were planned and culminated in the establishment of the Forest Products Laboratory at Madison, Wisconsin. For the past eight years Mr. Hall's energy has been devoted to the examination and recommendation for purchase by the National Government of 1,700,000 acres of timber and cut-over land in the White Mountains and Southern Appalachians, during which time he has gained an experience in timber examination, land classification, the handling of complicated land titles and the blocking up of holdings into suitable units for administration that is of a particularly unique and valuable character. During the war Mr. Hall was assigned to a conspicuous part in organization of the 20th Engineers, and at the close was a major in training for overseas service. Recently he has been making a survey of the wood-using industries of the Middle West for the purpose of determining their supply of raw material and the development of plans for a national forest policy, including the necessary part to be played therein by the Government, the timberland owners and the Public.

R. S. Kellogg, the other principal member of the firm, also began his professional and business career in the Forest Service, entering that organization in 1901 and continuing until 1910. During this period he had many important assignments covering all parts of the United States and Alaska. He made numerous forestry investigations in various parts of the country and brought out a large number of important publications. He had an exceedingly important part in the early conservation movement which focused the attention of the whole country upon the necessity of conserving supplies of timber and other natural resources. To Mr. Kellogg's efforts are due the plan of collecting annual statistics of forest products. The work was originally instituted by him and he wrote many of the earlier reports published by the Forest Service and the Bureau of the Census.

In 1910 Mr. Kellogg left a promising career in the public service to become Secretary of the Northern Hemlock and Hardwood Manufacturers' Association. Later

he became Secretary of the National Lumber Manufacturers' Association, and in 1918, Secretary-Treasurer of the Newsprint Service Bureau, with offices in New York. He will retain this position, his association with the new firm being in the capacity of stockholder and director.

VERSATILITY OF WOOD

A PAIR of green silken sox woven from fine fibers made from spruce and a coil of stout binder twine spun from twisted strands of fir are two of the typical products of western woods displayed on a panel just received in the office of the West Coast Lumbermen's Association in Seattle from the Forest Products laboratory at Madison, Wisconsin.

The exhibit has been arranged as a demonstration of the practical results obtained through the research work at the Madison laboratory and merely goes to illustrate once more and to emphasize that sawn and finished lumber is the crudest commercial product of the trees.

Among the other interesting specimen products included in the exhibit are: furniture reed and braid, used in making "wicker" furniture; paper rug yarn, extensively used in making bath-room mats and small household rugs; linoleum, with attractive patterns, made from wood flour and linseed oil; paper bagging that can be used in place of the jute bags now commonly employed in sacking grain; paper absorbent, which was quite generally used during the war as a successful substitute for absorbent cotton; artificial lath, produced from a mixture of wood flour and used as a substitute for wood lath; basket braid, made from twisted strands of paper; insulating rods and tubes, binder twine, paper cloth, glue tissue wrapping twine, paper webbing and rope, all produced from paper which in turn has been produced from native wood.

The basis for products such as phonograph records, insulating tubes and artificial lath is wood flour, which consists of spruce wood chemically treated and ground into a fine powder. The versatility of this flour is demonstrated by the fact that it is used in the peaceful art of making toys as well as in the more violent purpose of manufacturing dynamite. A case containing gunpowder made from wood flour is included in the exhibit.

Manufacture of clothing from artificial silk, produced from spruce, presents wonderful possibilities. The pair of sox on display is a mere example. A strip of silken cloth, tied with a silken cord—all made from spruce—show what can be done in this direction.

ODOR AND TASTE OF WOOD

MOST of our native woods are without pronounced odor or taste, but woods of the laurel family, of which sassafras and California laurel or myrtle are representatives, have a distinct spicy odor and taste.



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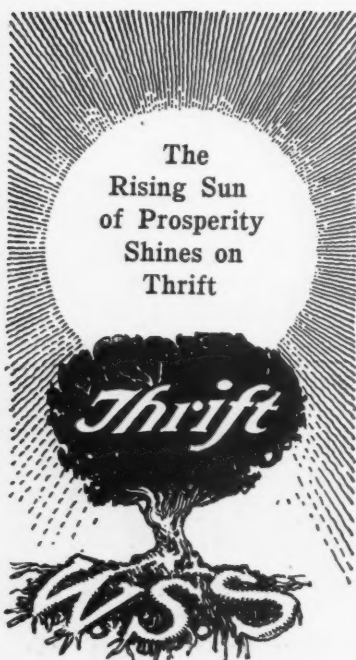
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Port Orford cedar of the Pacific coast has a very spicy, resinous odor; other cedars have a more aromatic odor, especially the pencil cedar or juniper. Hemlock has a slightly sour odor while cypress is somewhat rancid. Except in cedars and junipers these odors are scarcely strong enough to taint food unless it is brought into direct contact with the wood as in butter tubs or boxes. For wooden pie plates, butter dishes, bowls, buckets, candy pails, kegs and barrels, only woods are used which are without taste.

FOREST FIRE AIR PATROL

DISTRICT 5, of the United States Forest Service, reported the following interesting data on the forest fire patrol, via the air, for the two months of July and August: 745 flights, 92,605 miles of flight, 8 planes daily in service, 16,000,000 acres national forest land covered twice daily, 5,000,000 acres private timber covered twice daily, 6 forced landings, 1 fatality.

In addition to the above terse figures, the District Forester reports the system as 85 per cent efficient in discovery of fires, but amends this by stating that it will shortly be practically 100 per cent efficient. Equipping the planes with wireless telephones will largely assist in reaching this state of perfection.



FORESTERS ATTENTION

AMERICAN FORESTRY will gladly print free of charge in this column advertisements of foresters, lumbermen and woodsmen, discharged or about to be discharged from military service, who want positions, or of persons having employment to offer such foresters, lumbermen or woodsmen.

POSITION wanted by technically trained Forester. Have had fourteen years experience along forestry lines, over five years on the National Forests in timber sale, silvicultural and administrative work; three years experience in city forestry, tree surgery and landscape work. Forester for the North Shore Park District of Chicago. City forestry and landscape work preferred, but will be glad to consider other lines. Can furnish the best of reference. Address Box 600, Care American Forestry Magazine, Washington, D. C. (1-3)

YOUNG MAN recently discharged from the U. S. Navy, wants employment with wholesale lumber manufacturer; college graduate; five year's experience in nursery business; can furnish best of references. Address Box 675, Care American Forestry Magazine, Washington, D. C. (1-3)

Man to be discharged from the Army September 30th desires position in forestry work, with lumber or railroad company or assisting in investigations of utilization of wood products. Would accept position in other work. Is married man, graduate of Michigan Agricultural College, 1913. Has had experience in orchard work, clearing land, improvement cuttings, planting and care of nursery, pine and hardwood transplants, orchards and larger trees, grading and construction of gravel roads, and other improvement work. Has executive ability and gets good results from men. Please address Box 800, care of American Forestry Magazine, Washington, D. C. (9-11)

POSITION wanted by technically trained Forester; college graduate, 37 years of age and married. Have had seven years' experience in the National Forests of Oregon, California, Washington and Alaska. Also some European training. At present employed on timber surveys as chief of party in the Forest Service. Desire to make a change and will be glad to consider position as Forester on private estate, or as city Forester. Will also consider position as Asst. Superintendent of State Park and Game Preserve in addition to that of Forester. Can furnish the best of references. Address Box 820, care American Forestry Magazine, Washington, D. C.

ARBORICULTURIST is open to an engagement to take charge of, or as assistant in City Forestry work. Experience and training, ten years, covering the entire arboricultural field—from planting to expert tree surgery—including nursery practice, and supervision in the care and detailed management of city shade trees. For further information, address Box 700, care of American Forestry.

WANTED—Position as Forester and Land Agent. Technically trained forester, 33 years old. Practical experience along all lines included under the duties of the above positions. Former Captain, Field Artillery. Address Box 840, care American Forestry, Washington, D. C.

WANTED—Position with Lumber Company or Private Concern by technically trained Forester with five years practical experience. Box 820, care American Forestry.

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A CHRISTMAS SUGGESTION

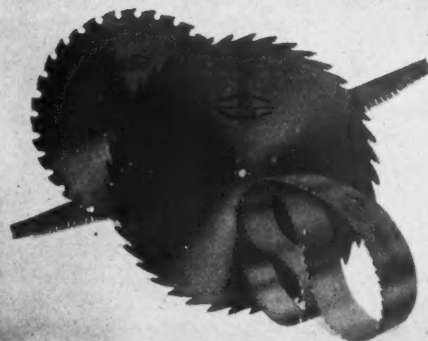
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AMERICAN FORESTRY

THE MAGAZINE OF THE AMERICAN FORESTRY ASSOCIATION

PERCIVAL SHELDON RIDSDALE, Editor



IN STRONG CONTRAST TO THE GLEAMING HEIGHTS ABOVE ARE THE SENTINEL TREES WHICH NESTLE AT THE FOOT OF THE FAMOUS MISSION RANGE IN MONTANA

DECEMBER 1919

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CHRISTMAS ON MOUNT RAINIER

AMERICAN FORESTRY

VOL. XXV

DECEMBER, 1919

NO. 312

NATIONAL FORESTS AND THE WATER SUPPLY

BY SAMUEL T. DANA*

FEW people need to be reminded that the prosperity of the West depends largely upon an adequate supply of water for irrigation. Water, rather than land, is the open sesame to the agricultural development of the semiarid regions. Vast areas of rich soil await only water to make them "blossom like the rose." To other vast areas water has already been brought from varying distances, and these are now among the most productive of all our agricultural lands. Irrigation alone is responsible for the sugar-beet fields of Utah, the alfalfa fields of Idaho, and the orange groves of California.

So literally has water meant wealth to the Rocky Mountains and Pacific Coast States that the "Golden West" no longer need base its claim to the title on the magic metal that brought it fame and prosperity in the early days. The gold of the grain field and of the citrus grove is now worth more than the gold of the mine. The \$247,000,000 which represents the annual value of the crops produced on the 150,000 farms comprising the 13,200,000 acres of irrigated land in the West is nearly three times as great as the value of the precious metals produced annually in the same region. Colorado, preeminently a land of minerals, now produces each year on irrigated lands a

crop worth more than the entire product of its mining industries and approximately twice as much as the output of precious metals. California, the "Golden State," contributes annually nearly four times as much wealth in crops as in precious metals.

If the precipitation were as evenly distributed in the West as it is in the East, there would not be the need

for irrigation that now exists, and the main purpose of the National Forests would be simply timber production. But it is not evenly distributed, and that is where the trouble lies. Except for a narrow strip along the Pacific Coast from San Francisco north to the Canadian line, the great bulk of the precipitation occurs in the mountains.



HOW THE FOREST GIVES SERVICE

What the National Forests mean to the water user may be summed up in one word "service"—service that is none the less real because it is not always obvious and because its exact value can not always be expressed in dollars and cents. Every user of water which originates in the National Forests—and this includes by far the greater number of water users throughout the West—must look to the Forests for safeguarding his supply.

Throughout the Coast Ranges, the Cascades and Sierra Nevadas, and the Rocky Mountains and Colorado Plateau the rain and snowfall is far greater than in the intermediate valleys and plateaus.

The result is that the majority of water users depend for their supply on water that originates a considerable distance away. Some of the most productive agricultural lands in the region receive hardly more than enough precipitation to support a desert vegetation, while the evaporation is correspondingly great. Greeley, Colorado;



WHAT WATER WILL DO. WITH—WHERE THE ORANGES GROW

The orange groves and other irrigated lands in the foreground obtain their water from the mountains in the background, which are included in the Angeles National Forest, California. At the lower elevations these mountains are covered with a dense growth of brush, or chaparral, while at the higher elevations are forests of western yellow pine, Jeffrey pine, and other trees. The value of citrus fruits produced in the eight southernmost counties of California in 1914 is estimated by the Los Angeles Chamber of Commerce to have been \$33,000,000.

Provo, Utah; Phoenix, Arizona, and Fresno and Riverside, California, all of which are in the center of extremely productive sections, have an annual precipitation of less than 15 inches with an annual evaporation from a free water surface at least three or four times as much.

As a natural consequence of the difference in amount of precipitation in the mountains and at the lower elevations, the former are generally forested and the latter treeless. The National Forests, of course, are located in the mountains, where the trees are. From the brush-covered foothills of the San Jacinto and San Bernardino Mountains in southern California to the magnificent Douglas fir forests of the Olympic Mountains in northern Washington, and from the pinon and juniper stands of the southern Rockies in New Mexico to the pine forests of the northern Rockies in Montana and Idaho, the mountains and the National Forests coincide.

An intimate relation exists between the National Forests and irrigated lands throughout the West. At least 85 per cent, and very likely more, of the water

used to irrigate these 13,200,000 acres, whether it comes from surface streams and lakes or from underground sources, has its origin in the mountains where the National Forests are located. Obviously, not all of this mountain area is forested, nor is all of the forested area under Federal ownership. At the same time, the National Forests include a large part of the area from which the bulk of the irrigation water is derived, and must therefore exert an important influence on the amount and character of the supply.

No figures are available as to the exact value added to these lands by the application of water, but it unquestionably runs into the hundreds of millions of dollars. Without water much of this area would be practically worthless, and the value even of that portion on which dry farming is feasible would be greatly reduced. In the vicinity of Salt Lake City, Utah, for example, irrigated lands deriving their water from the Wasatch National Forest are valued at from \$100 to \$1,000 per acre, with an average of probably \$400 per acre; while land without water in the same district, except where it requires drainage, is

practically valueless. Near Los Angeles, California, unimproved lands with water rights are worth from \$200 to \$500 per acre, while bearing orange or lemon groves may be valued at \$3,000 or even more per acre. What the water supply protected by the Angeles National Forest



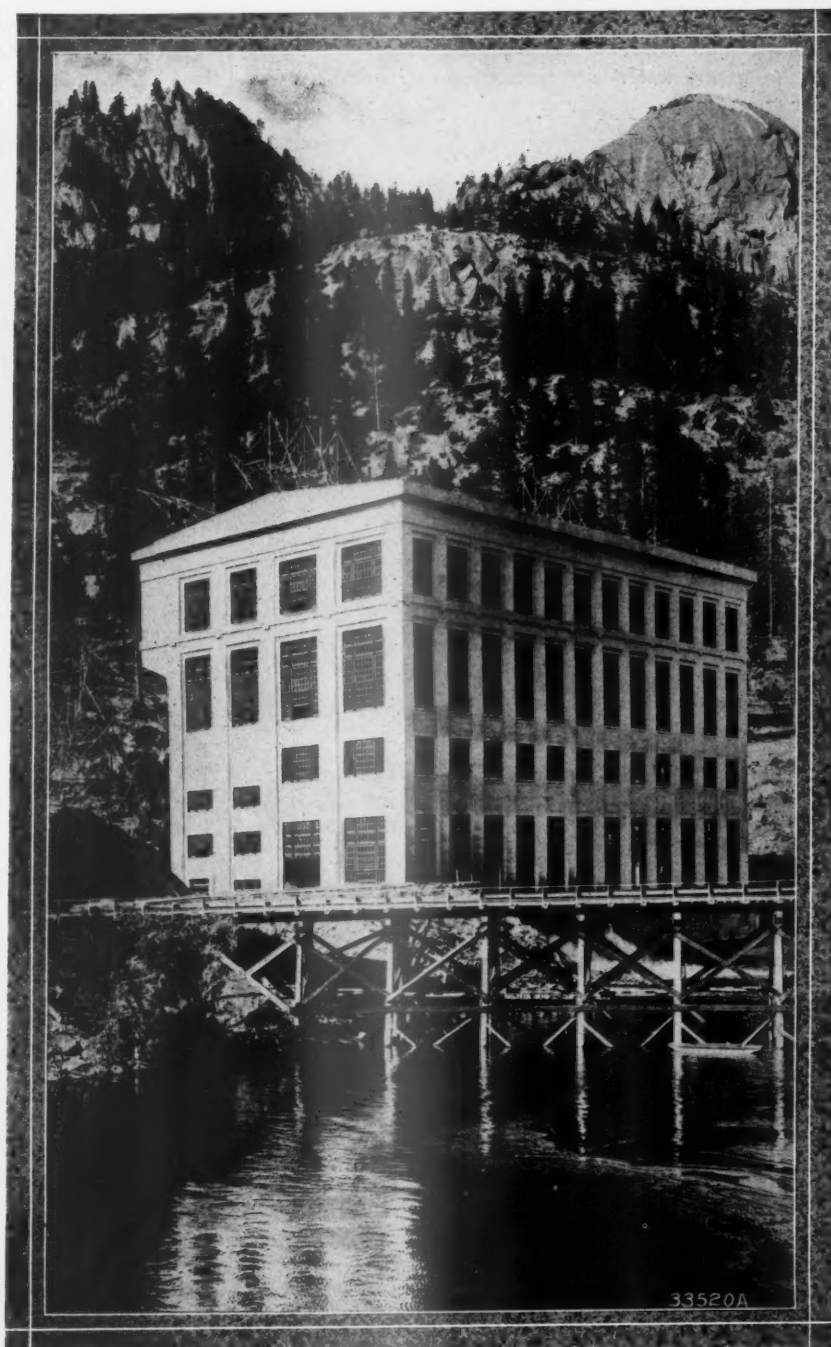
WITHOUT—WHERE THE AGAVES GROW

Semi-desert land near Silver City, New Mexico, now used during part of the year as stock range. If irrigation were possible many of the desert areas throughout the West could be converted into fertile agricultural land. Water, rather than soil, is frequently the decisive factor in determining whether cultivation is practicable.

means to this region is also well illustrated by the value of the crops produced on irrigated lands that without water would be of little or no agricultural value. In 1915, 25,750 acres devoted to citrus fruits, alfalfa, and sugar beets, deriving their irrigation water from the San Antonio watershed, with an area of only 24 square miles, yielded crops valued at \$5,400,000; while 5,870 acres of citrus fruits, deriving their water from the San Dimas watershed, with an area of only 18 square miles, yielded crops valued at \$2,600,000.

Irrigation represents one of the vital needs for water in the West, but there are others. Water is the "white coal" which furnishes or will furnish the motive power for lighting systems, trolley lines, and manufacturing plants everywhere in the Western states. As such it constitutes an immensely valuable resource. The western mountains contain more than 72 per cent of the potential water power of the United States. Through lack of markets, only a comparatively small part of this has been utilized, but in the last 20 years great strides have been made in development. In the decade from 1902 to 1912, for example, water-power development in the Western states increased 451 per cent, or more than four times as rapidly as in the rest of the country. How rapidly water power is developed in the future will depend solely on how many new industries and people make their home in the West. Judging by how many have gone there in the past, the demands of the Western states upon their "white coal" will continue to

multiply. No less than forty-two per cent of the water power resources of the eleven Western states, or approximately 31 per cent of the water-power resources of the entire country, is actually within the National Forests. Moreover, a large part of the remaining power, although developed outside of the Forests, is derived



WHERE "WHITE COAL" IS TRANSFORMED INTO ELECTRICITY

A power plant on the Sierra National Forest, California. The pipe line has a drop of 2,000 feet. The National Forest contains 42 per cent of the water power resources of the West. These can be developed by private interests upon payment of an annual charge and under restrictions that protect the public against monopoly.

from streams rising in them. In 1915 nearly 42 per cent of the water power already installed was developed by plants some part of which occupied National Forest lands or which were directly dependent on storage reservoirs constructed on National Forest lands, and 13.6 per cent more was similarly dependent on other public

lands. Even these figures, however, do not bring out the full significance of the National Forests in their relation to the water-power resources of the West. A large part of these resources outside of the Forests are so located as to be extremely difficult of development under present conditions, and so a continually increasing proportion of new water-power developments is utilizing sites within National Forests or other public lands.

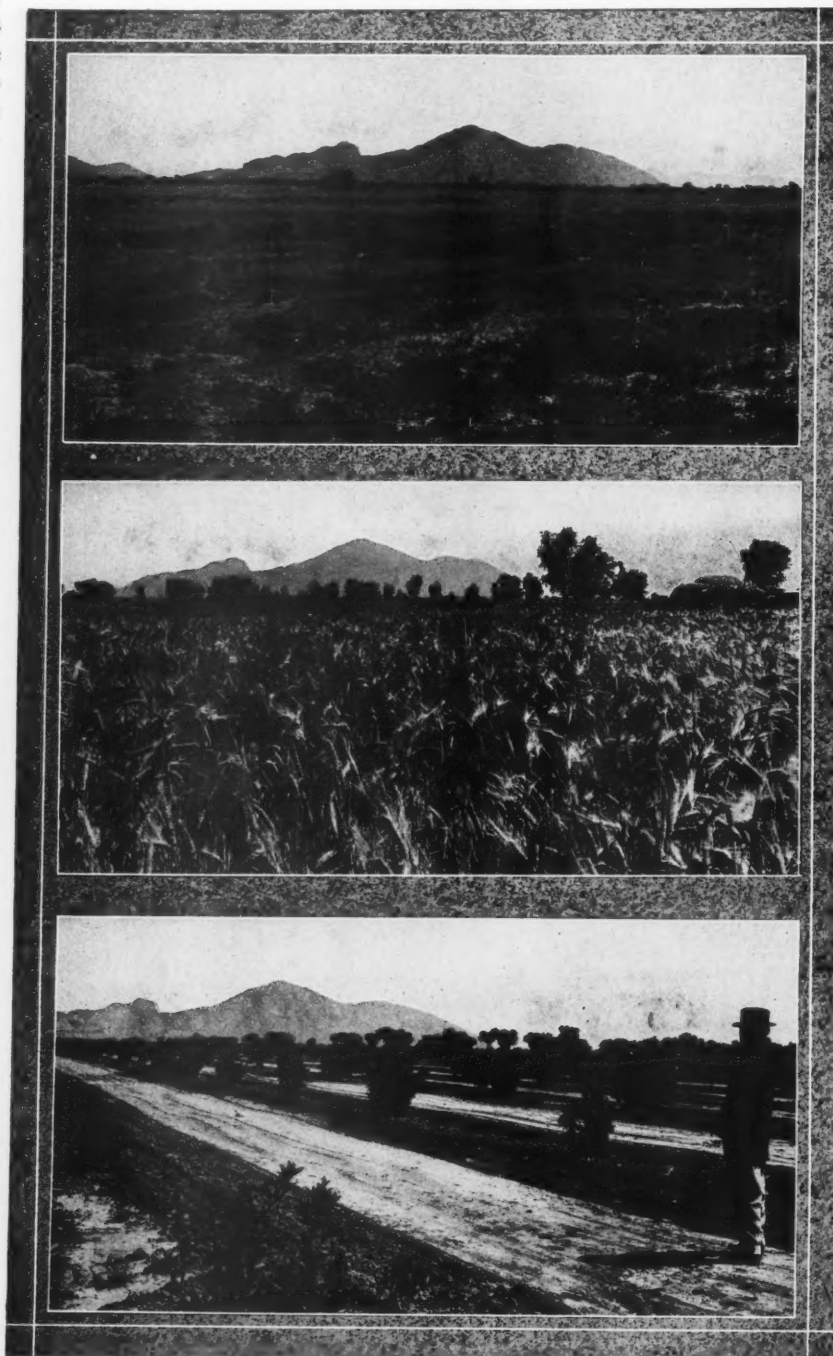
Farther downstream, in the lower reaches of the rivers and in the harbors into which they flow, water contributes still further to western prosperity. Inland water transportation in the Mountain and Pacific states will never attain the development of which it is capable in the Eastern and Central states but it is already of considerable importance, and should become increasingly so as the population grows denser and traffic correspondingly heavier.

According to the 1916 report of the Chief of Engineers, United States Army, there were at that time some 26 navigable streams in the Western

States, with a navigable length of approximately 1,746 miles and an annual movement of over 14,000,000 tons valued at more than \$250,000,000. The relation of the

National Forests to navigation is not strikingly obvious, since practically all the navigable portions of western streams lie outside of the Forest boundaries. Yet by far the greater part of the water that they carry originates in their upper courses, which are to a large extent included within the National Forests. Any influence that the Forests may exert on this water is therefore felt indirectly, but none the less surely, by the streams and by the harbors into which they flow.

Ordinary drinking water may lack the romantic associations of some other beverages, but it nevertheless is an everyday necessity for thousands of families scattered on farms and ranches and in numerous small settlements throughout the



BEFORE AND AFTER

Upper.—A portion of the Salt River Reclamation Project in southern Arizona previous to irrigation, covered only with a sparse growth of desert vegetation.

Center.—The same area after water has been applied, covered with a vigorous crop of barley.

Lower.—The same area several years later, covered with a thrifty young orange grove.

West and for the still larger population comprised in the towns and cities. How much effort and money must be expended by western cities in obtaining a pure and

abundant water supply is shown by the examples of Los Angeles and San Francisco, the first of which has considered it worth while to spend some \$25,000,000 to bring water from Owens Valley on the east side of the Sierras across 250 miles of desolate and rugged country; while San Francisco is going back 190 miles into the fastnesses of the Sierras at an estimated cost of \$77,000,000 in order to get its supply from the famous valley of the Hetch Hetchy.

Some 732 western towns and cities, with an aggregate population of 2,265,000, depend on the National Forests for their domestic water supply. This does not include, of course, ranches and small settlements equally dependent on the Forests, nor the towns and cities securing their domestic water from streams and underground supplies which are at some distance from the Forests, but which rise from sources within them. Denver, Colorado; Salt Lake City, Utah; Los Angeles, California, and Portland, Oregon, are conspicuous examples of large cities which are insured a pure

and abundant water supply by the National Forests. So important is this function of the Forests that many communities have entered into co-operative agreements with

the Forest Service for the better protection of the watersheds from which they get their supplies.

Perhaps the most obvious relation that exists between forests and water is the tendency of the tree cover to check erosion. The leaves and branches of the trees prevent the rain from beating upon the soil as it does in the open; the cover which they afford delays the melting of snow in the spring; the upper layers of the forest soil act as an enormous sponge that absorbs large quantities of water which in turn are passed on to the great reservoir of mineral soil beneath; and finally, the surface cover of stumps, fallen twigs, branches, and even whole trees acts as a mechanical obstruction to prevent rapid run-off. The



THE DESERT BLOOMS

Upper.—With and without—a striking illustration of the transformation worked by the application of water. The dry land outside of the fence on the Minidoka Reclamation Project is a sagebrush desert; that inside, a fertile field of alfalfa.

Lower.—An apple orchard on the Boise Project of the Reclamation Service in Western Idaho on land formerly covered with sagebrush.

surface run-off from forest areas is less both in total amount and in velocity, than that from similarly situated unforested areas. The steeper and more rug-

ged the topography, the more marked is this contrast.

In hilly country some erosion is, of course, inevitable under any conditions. When the soil cover of trees, underbrush, and litter is kept intact, however, this is more often beneficial than otherwise, since only the lighter soil particles are washed away, to be later deposited in the more level lands below, adding to their fertility. But when this protective cover is interfered with, whether by fire, destructive lumbering, overgrazing, or injudicious clearing of land for agriculture, the proportion of coarser, infertile materials washed away increases greatly and transforms erosion from a constructive into a dangerously destructive force, difficult of control and capable of doing untold damage.

From the standpoint of the water user, the tendency of the mountain forests to prevent erosion is of the utmost importance. Wherever storage reservoirs must be used, whether for municipal supplies, irrigation, or water power, they are exposed to the ever-present danger of silting up. Every bit of soil

brought down by the streams and deposited in them reduces their capacity and consequently their effectiveness by just so much. This sedimentation is serious

under any condition, but doubly so when, as not infrequently happens, no other satisfactory dam sites are available and the reservoir can not be replaced at a reasonable cost.

Water heavily laden with eroded material often decreases the efficiency and increases the cost of maintaining diversion dams, pipe lines, flumes, canals, and other irrigation works. Sometimes such water damages the crops to which it is applied, and not infrequently it seriously injures or even ruins the land by burying it under a mass of sand, gravel, bowlders, and other infertile debris. Excessive erosion may interfere seriously with navigation by filling the streams with material which is deposited in their lower reaches and in

the harbors into which they empty. The action of the forest in reducing surface run-off tends also to regulate the flow of streams. Instead of rushing away in uncon-



WATER FOR IRRIGATION AND POWER

Upper.—Roosevelt Dam and power plant (in right center foreground). This reservoir stores 1,140,000 acre-feet of water and, together with the Verde River, furnishes the water supply for the Salt River Reclamation Project in southern Arizona. The bulk of the water for the project originates on the Tonto National Forest and the White River Indian Reservation.

Lower.—Minidoka Dam and power plant. This dam supplies water for the irrigation of 120,300 acres on the Minidoka Reclamation Project in southern Idaho. The electricity developed at the power plant is used on many farms for lighting, heating, and cooking.

rollable torrents the water is absorbed into the great reservoir of mineral soil, from which it is gradually paid out to the springs and streams. This tends to decrease the high water run-off and to increase the low water run-off. Both results are good. The decrease in the high water run-off means that there is less danger of destructive floods and less waste of valuable water; while the increase in low water run-off means that a larger supply of water is available during the dry season, when it is particularly needed. It is the low water flow that to a great extent determines the availability of any given supply for municipal use, irrigation, or hydro-electric development, and anything which will increase this flow is therefore a factor of prime importance.

What One National Forest Does.

A typical example of the ways in which the National Forests benefit the water user is furnished by the Pike National Forest in Colorado. This Forest extends along the main range of the Rocky Mountains from somewhat north of Denver to south of Colorado

Springs, and includes within its boundaries a considerable portion of the headwaters of the South Platte and Arkansas Rivers. Irrigation by means of water coming

from the mountains included in the Pike National Forest had its modest beginnings in 1860 along the South Platte River in South Park and also near Denver. Since then the area on which irrigation is practiced has grown steadily, until now it is estimated at some 400,000 acres, valued at about \$40,000,000 and with an annual crop production of over \$10,000,000. On many acres where water is not available dry farming is practiced, but the results are uncertain and the yields much less than on irrigated land. The value of water in this region is so great that the natural flow of the streams is greatly over-appropriated, and there is need for every additional drop that can be developed or stored. Practically all of the Great



IRRIGATION RESERVOIRS ON THE NATIONAL FORESTS

Upper—Lake Keechelus on the Wenatchee National Forest, Washington, used as one of the storage reservoirs for the Yakima Reclamation Project. When completed, this project will include more than 146,000 acres of irrigated land. The crop production in 1915, on about two-thirds of the area ultimately irrigable, was valued at \$2,400,000.
Center—Granby Lakes on the Battlement National Forest, Colorado. This Forest was created in 1892 at the request of local residents to protect their supply of water for irrigation and domestic use. Within its boundaries are now some 400 reservoirs supplying about 140,000 acres of irrigated land valued at more than \$2,500,000.
Lower—Jackson Lake on the Teton National Forest, Wyoming, with the Teton Mountains in the background. This forms one of the main storage reservoirs for the Minidoka Reclamation Project.

Plains lying east of the Rocky Mountains is potentially agricultural land, and the only limit to its development is the amount of water which can be secured for irriga-

tion. So well recognized is the part played by the forest cover in protecting the water supply that in one case an organization of farmers has protested

reservoir, Lake Cheesman, with a capacity of about 26,000,000,000 gallons and a watershed of 1,152,000 acres, in the heart of the Pike Forest. Colorado Springs has a

series of reservoirs which also get their supply from the Pike. Altogether, some 35 cities and towns with an aggregate population of 275,000, and an investment in waterworks of over \$17,600,000, obtain their domestic supply from this Forest. The watersheds supplying Denver, Colorado Springs, Manitou, Cascade, and Idaho Springs are given special protection against fire. At the request of local residents, Congress has added nearly 28,000 acres to the Pike Forest, while farther north, on the Colorado National Forest, Congress in 1916 authorized the addition of some 540,000 acres for the purpose of watershed protection.

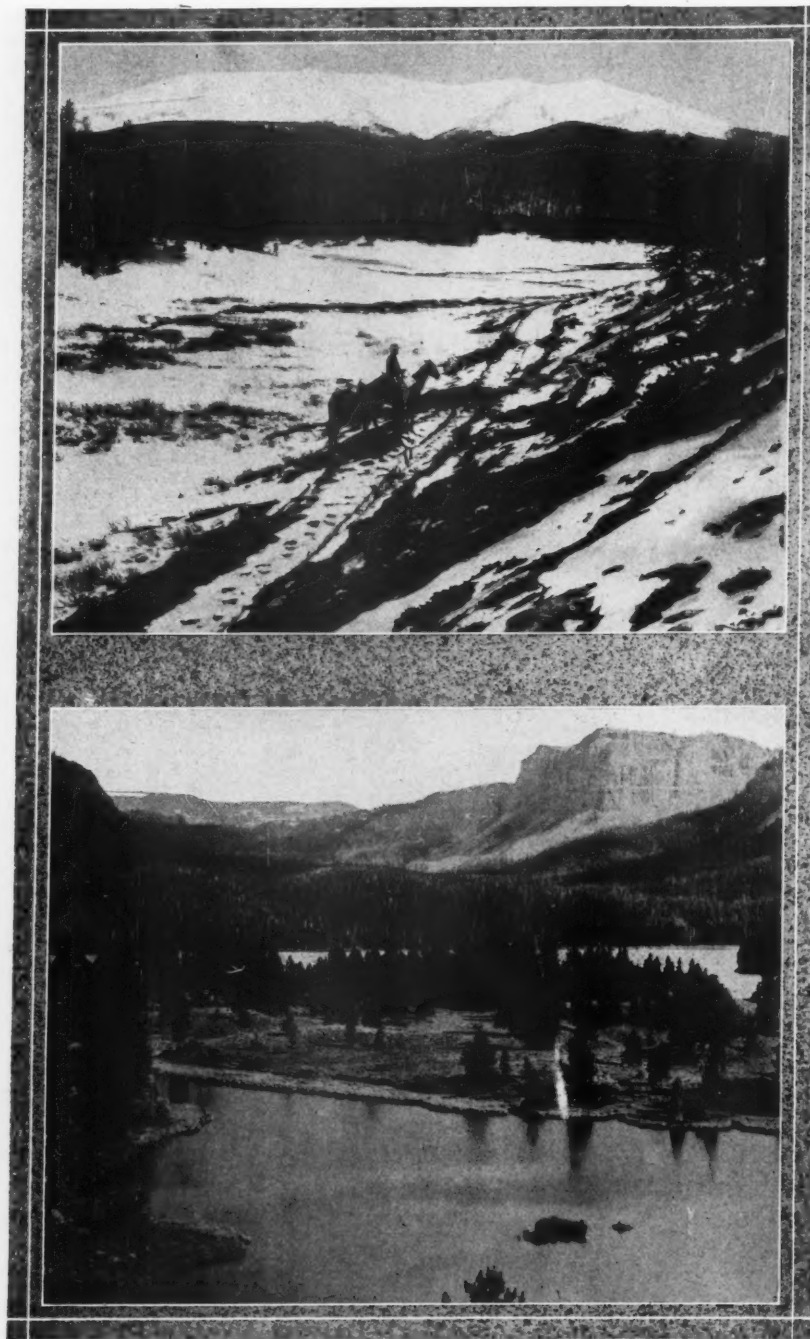
Where fire has destroyed the forest cover on certain of the watersheds within the Pike, young trees are being planted. Already some 3,000 acres have been planted by the Forest Service on the watersheds denuded by the great fire of 1866, from which Colorado Springs and its suburbs obtain their water, and plans have been perfected for the reforestation of an additional 9,000 acres.

The development of hydro-electric power bids fair to constitute another important use of the streams which take their rise in the Pike National Forest. It is only in recent years that water in this region has been utilized for power, but the possibilities for development offered by the streams are tremendous.

Placer mining, which, aside from drinking and bathing, probably called for the first use of water on the Pike National Forest, is now practically a thing of the past. The use of water in the milling of ores, however, is quite common in a number of districts, and there are many

against any cutting of timber on certain watersheds. No less important is the use of the water for domestic and municipal purposes. Denver has its main storage

mills which could not operate without an abundant and constant supply. The value of water as a scenic, or esthetic asset, and its contribution to recreation in the



HOW THE NATIONAL FORESTS PROTECT RIVER SOURCES

Upper.—Willow Creek, one of the sources of the Colorado River, in the Arapaho National Forest, Colorado. The stream comes gently from the belt of forest which stores melting snow from above timber line on the Parkview Peaks.

Lower.—Trapper's Lake, also on the headwaters of the Colorado River, in the White River National Forest, Colorado. The dense stands of timber which are characteristic of such situations help to prevent erosion and irregular run-off.

region, should also not be overlooked. To the Pikes Peake region come thousands of visitors every year, attracted by the scenery and climate. Periodically dry streams and eroded stream beds are far from attractive, and in helping to prevent erosion and to maintain a steady stream flow the forest adds materially to the value of the region for the tourist and pleasure seeker.

Some Results of Forest Destruction.

How any interference with the protective cover of trees and other vegetation works to the detriment of the water user is illustrated by the history of a small stream on the Pike Forest known as Trail Creek. This was originally a clear stream confined to a narrow channel and with comparatively little erosion. Gradually, however, the character of the stream changed as a result of heavy cutting on its watershed, prior to the creation of the National Forest and on private lands included within the Forest boundaries, followed by a number of severe forest fires. Floods became more frequent, erosion set in, the stream beds were widened, and their bottoms began to fill up with sand and gravel washed down from above.

In April, 1914, a heavy flood occurred which wrought serious damage to a small ranch at the mouth of the creek. Approximately 11 acres of irrigated land worth \$40 an acre and including nearly a fourth of the irrigated land on the ranch, were buried under from 18 to 30 inches of coarse gravel and rendered practically worthless. Furthermore, the flood filled up the irrigating ditches so completely and changed the course of Trail Creek so markedly as to make it impossible to continue the use of water from the creek for irrigation without going to considerable expense in the construction of new improvements. In August of the next year a heavy hailstorm resulted in another flood which washed out several acres of hay land along the creek bottom and ruined 16 tons or more of hay worth \$14 a ton. The

same storm also brought down an immense amount of gravel in an ordinary dry gulch running through the farm and piled this 2½ feet deep against the kitchen



EVERYWHERE THE NATIONAL FORESTS AND THE MOUNTAINS COINCIDE

Upper.—Headwaters of Lewis River in the Rainier National Forest, Washington, with Council Lake in foreground and Mount Adams in background.
Lower.—Typical view of the Cascade Mountains in the Columbia National Forest, Washington, with Mount St. Helens in background.

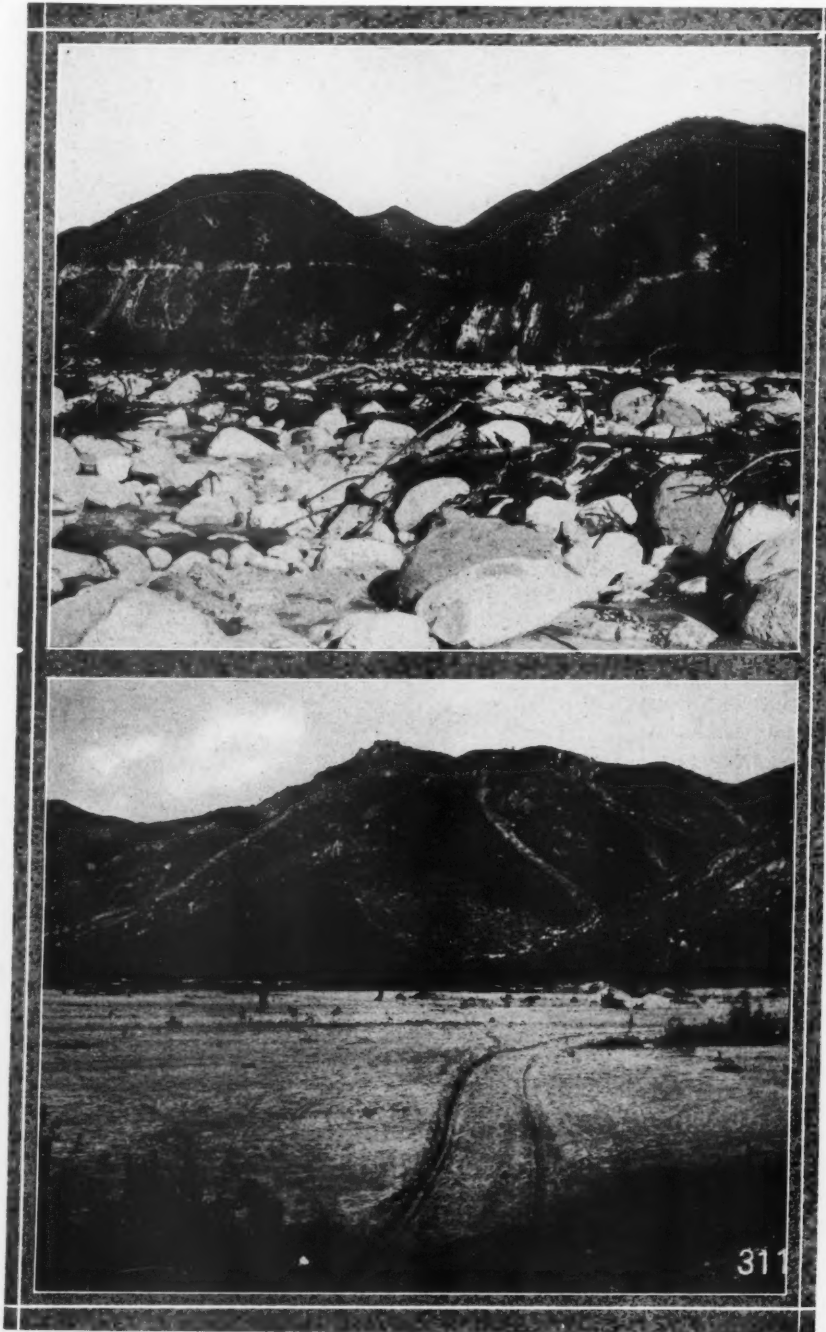
door. Altogether, the floods of these two years damaged this one small ranch to the extent of at least \$600 and rendered approximately one-fourth of it practically non-

productive. Other examples of the damage resulting from interference with the forest cover before the creation of the National Forests can be selected almost at random from the Mountain Forests of the West. In the Sangre de Cristo Range and the Greenhorn Range, in what is now the San Isabel National Forest, in southern Colorado, it is very noticeable that streams whose headwaters have been denuded to a considerable extent of their protective cover have badly eroded channels and are subject to great extremes in flow, with frequent destructive floods, while no harmful effects of this sort are noticeable on streams whose headwaters are well timbered. Wild Cherry Creek, for example, after being almost completely burnt over, was subject to spring floods and to damage from erosion. During July it would dry up at a distance of not over 2 miles from the mouth of the canyon. As the watershed has become reforested these conditions have changed gradually until today the stream is not subject to floods and erosion and is more regular in its flow.

During the summer it now reaches a point 4 miles below the mouth of the canyon and is used early in the fall for irrigation. Apache Creek, which formerly flowed the full length of its course all summer, since the destruction of the timber at its headwaters disappears only 2 or 3 miles from its head; and its only value for irrigation purposes after the middle of June lies in its flood waters, which are very uncertain. Hardscrabble and Medano Creeks have suffered similar results, and the list might be extended almost indefinitely.

On the North Fork of the Gunnison River, in western Colorado, much flood damage has occurred as a result of the extensive fires which burned over its upper watersheds in the late seventies and early eighties. Previous to that time the creek channels were narrow and rocky, beavers were abundant, and the bottom lands showed little erosion.

In 1884 a



WHAT TOO RAPID RUN-OFF CAN DO

Upper.—Boulders for soil. This view of the Santa Ana River in southern California shows how torrential run-off may wash away the soil and leave the land covered with snags, gravel, boulders, and other infertile debris.

Lower.—Sand for alfalfa. The sand waste in the foreground is typical of hundreds of acres of formerly good alfalfa land along the San Diego River in southern California which were seriously damaged by the flood of January, 1916.

heavy snowfall was followed by a flood which is estimated to have ruined at least 2,000 acres of good ranch land. Since then destructive floods have occurred every

few years. In 1912 irrigated land and other property was damaged to the extent of some \$20,000, a \$5,000 bridge was washed out, and \$8,000 was expended in preventing the destruction of two other bridges. In spite of this comparatively recent damage it is generally believed that floods are becoming less frequent and less destructive as adequate fire protection on the Gunnison Forest is gradually restoring a forest cover on the burned-over areas.

Thirty years ago a big fire burned over the watershed of Gypsum Creek, which is located in central Colorado in what is now the Holy Cross National Forest. Two years after this fire the low water flow of the creek was so reduced that the use of water for irrigation from it was restricted to the first 47 decrees. Since then the flow had gradually increased with the establishment of a dense stand of timber until now it furnishes sufficient water for 130 decrees.

The following letter from a rancher in northern Wyoming throws light on what the protection afforded by the Bighorn Forest means to the water user in that part of the country: "I

have resided on Rock Creek for 28 years. During all this time I was owner of a ranch and was dependent on a good supply of water for all my crops; the welfare of

my stock and my own financial standing depended, therefore, more or less, on a good flow of water in Rock Creek. All these reasons make a man observant and thoughtful about any causes that may prevent a normal flow of water in any stream the headwaters of which are in the mountains. We all know that if a forest fire runs through the biggest portion of the watershed of a stream the water supply of such a stream is greatly diminished, if not entirely cut off, during the latter part of July and August, and untold damage is done to all ranchmen who are dependent on such a burned-off area for their irrigation water.

"As proof of the foregoing, I mention the great fire on the headwaters of Rock Creek



THE FIRE MENACE

Upper.—Vista Point, on the Santa Fe National Forest, at the headwaters of the Pecos River. Dense stands of timber are typical of the higher elevations, where fire has been kept out, and form an ideal cover for the watersheds.

Lower.—View on the Rainier National Forest, Washington, along Stabler Ridge and Niggerhead. Where fires have burned we have denuded slopes like this, which are a menace to the lands below because of the danger of erosion and floods.

in 1890, when four-fifths of the Rock Creek watershed was burned off. There was good reason to think it was incendiarism. Immediately after the fire and for eight

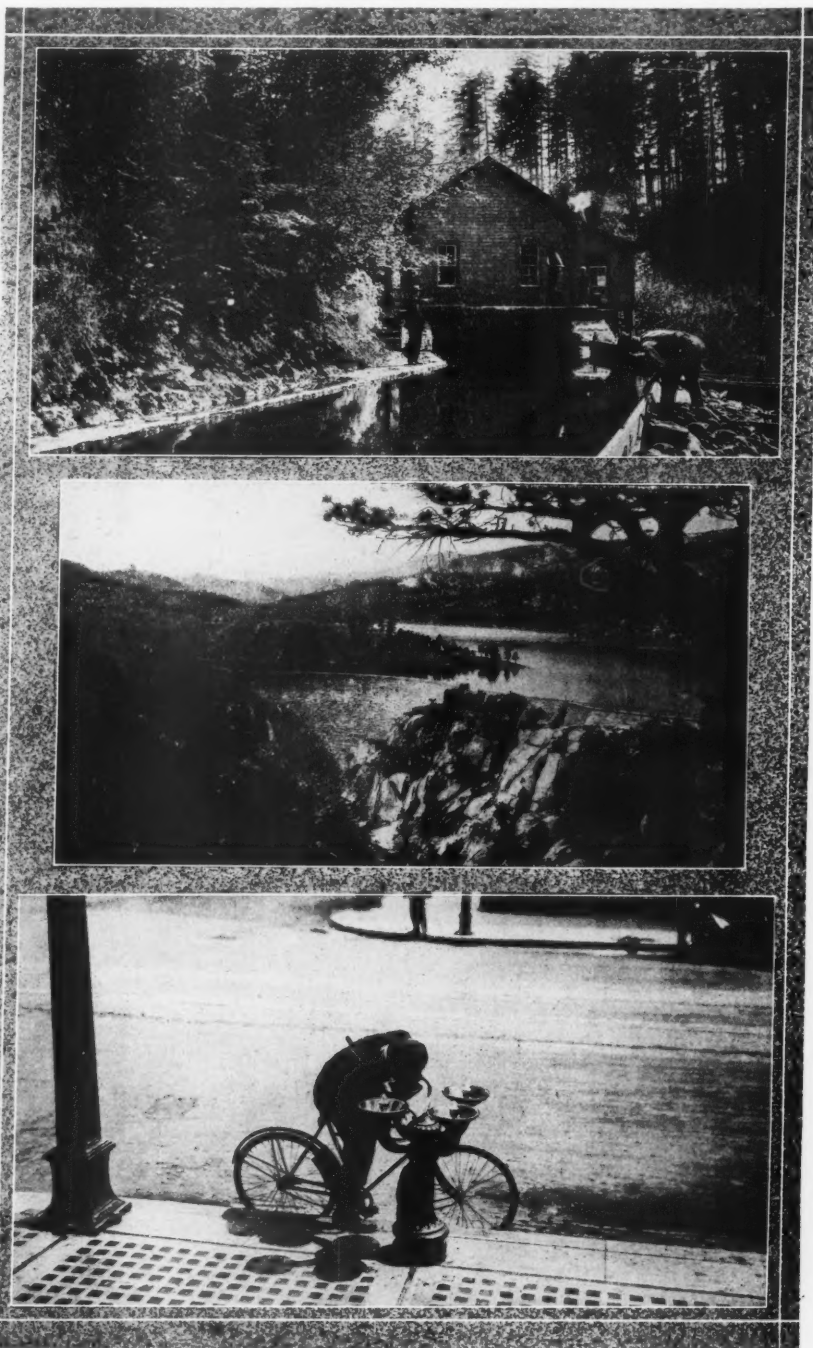
years afterwards there was very little water at the right time. There were some destructive floods too early in the season to do the irrigator much good. But as the hills became covered with young reproduction the flow of Rock Creek kept increasing and the floods became less destructive, and today, 20 years after the fire, Rock Creek is nearly normal again, but not quite, for the reason that in the head of the main fork the fire was so destructive that there were no seed trees left for a distance of nearly 5 miles on the south side of the creek, and consequently the reproduction is very scattering.

"In conclusion I wish to state that anyone who successfully farms a ranch in this part of Wyoming understands the great importance of keeping the forest fires out of the mountains and of maintaining a good stand of timber on the watersheds of all streams to hold the snow and help prevent the rapid run-off of the water too early in the season to be of much use to the irrigator."

Many examples of destructive floods caused by over-

grazing in the mountains prior to the creation of the National Forests are furnished by the State of Utah. In what is now the Fillmore National Forest the Chalk

Creek, Pine Creek, Meadow Creek, Fool Creek, Oak Creek, and Scipio watersheds, which supply the water for 27,000 acres of irrigated land and for the towns of Fillmore, Meadow, Oak City, and Scipio, were at one time so heavily overgrazed that the resulting floods damaged roads, reservoirs, cultivated land, and other property to the extent of thousands of dollars. Since the creation of the National Forest grazing on these watersheds has been prohibited or restricted, and the vegetative cover has had a chance to reestablish itself. As a result, the floods have been steadily decreasing, both in number and severity, until they are now practically negligible. The importance of the protection exercised by this Forest is still further



PROTECTION OF DOMESTIC WATER SUPPLIES

Upper.—Intake of the water system for the city of Portland, Oregon. Water for the city comes from the Bull Run Watershed, entirely within and protected by the Oregon National Forest.

Center.—Lake Cheesman, in the heart of the Pike National Forest, Colorado—the main reservoir for the water supply system for the city of Denver.

Lower.—A street drinking fountain in Portland, Oregon. The purity and abundance of the water is assured by the fact that it comes directly from the Oregon National Forest.

emphasized by the fact that, together with the Fishlake and Sevier National Forests, it is the source of water used in the irrigation of some 200,000 acres, valued at

over \$18,000,000, and as the domestic supply for some 28 towns, with a total population of about 13,000. *How National Forest Administration Benefits the Water User.*

In the actual management of the National Forests every precaution is taken to see that the interests of the water user are fully protected. No utilization of their various resources is permitted unless a negative answer can be given to the question, Will the proposed use have any injurious effect on the water supply?

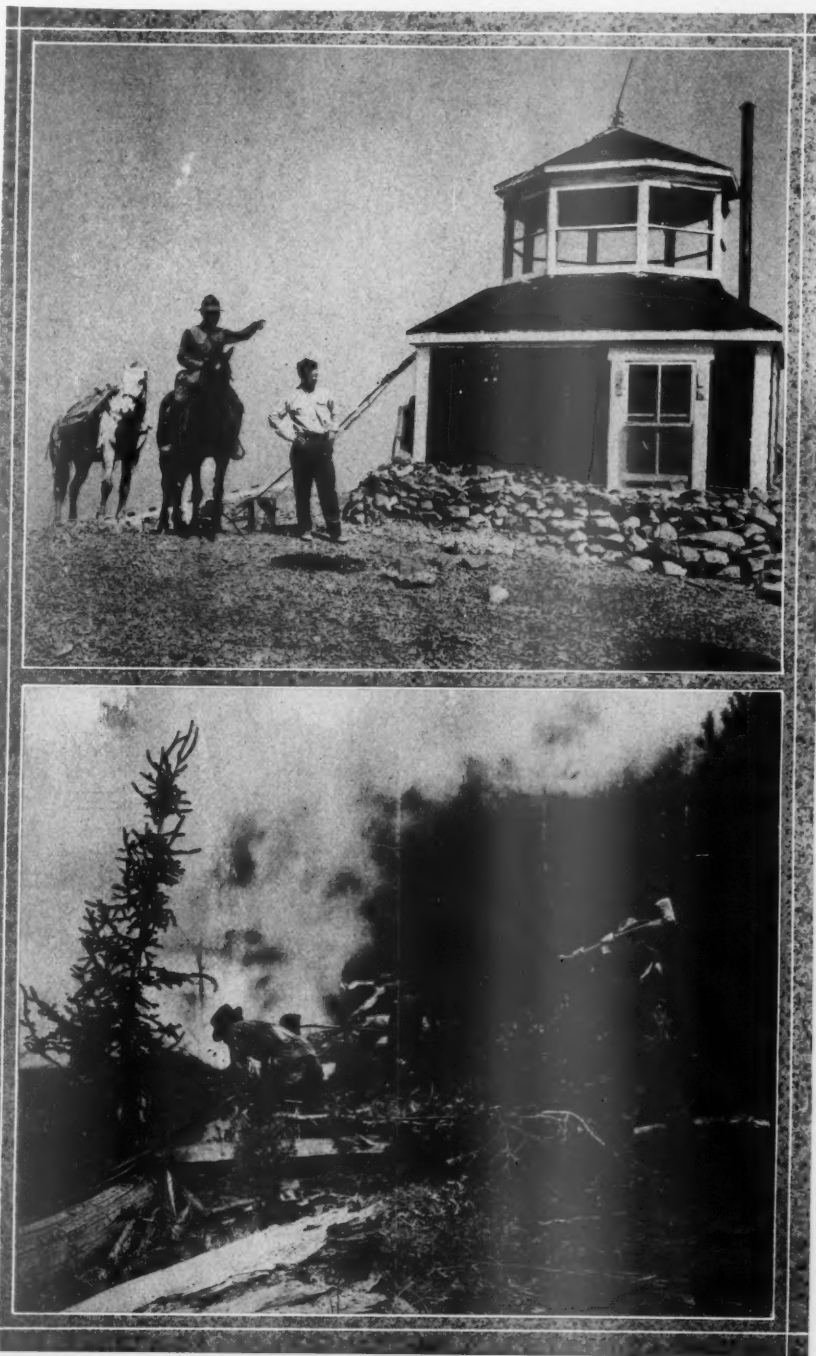
An outstanding feature of National Forest administration is the emphasis placed on fire protection. Fire is the worst thing that can happen in a forest, both as regards destruction of property and interference with the water supply. Every fire, no matter how small, destroys some of the organic material in the surface layers of the soil, and to that extent reduces its absorptive capacity. Repeated fires on the same area, even if they do not destroy the forest outright, may practically nullify its effects in preventing erosion and regulating stream flow. Every effort is made

to control so dangerous a menace. The guiding idea is to prevent fires from starting and to put out those that do start before they attain any considerable head-

way. Various means are used to bring home to the general public the seriousness of the fire danger and to secure the cooperation both of local residents and transient visitors. Lookout stations are established on mountain tops and at other points of vantage for the prompt detection of fires. These are supplemented by riding patrols. Boxes of fire-fighting tools are placed at strategic points. Roads, trails, and telephone lines are built as means of quick communication. Extra men to serve as fire guards are appointed during the danger season, and the local community is so organized as to make an efficient fire-fighting force available on short notice.

The system has now reached a stage of efficiency where the majority of fires are

brought under control before they do any serious damage. In 1916, for example, 73 per cent of the 5,655 fires on the National Forests were extinguished before they had



FIRE PROTECTION ON THE NATIONAL FORESTS

Upper.—A fire-lookout station on the summit of Mount Eddy, on the Shasta National Forest, California. Lookout stations of this sort make possible the prompt detection of forest fires. They are connected by telephone with the headquarters of the Forest Supervisor, who is thus enabled to organize and dispatch a fire-fighting crew before the fire gains any considerable headway.

Lower.—Extinguishing a fire on the Wasatch National Forest, Utah. In the mountains of the West axes and shovels play a much more important part than water in the suppression of forest fires.



PLANTING TREES ON DENUED LANDS

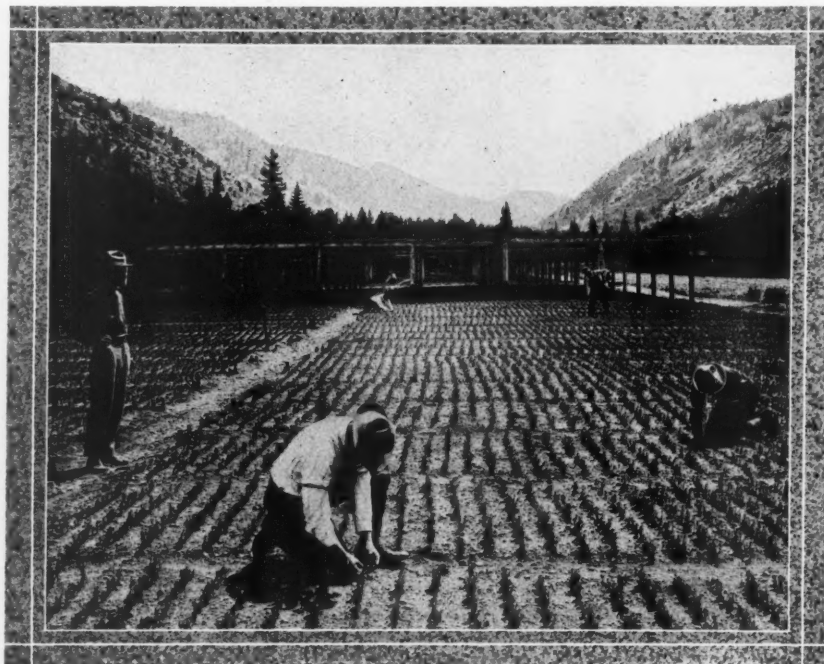
Transplant beds at the Cottonwood Nursery on the Wasatch National Forest in Utah. About 10,000,000 forest tree seedlings and transplants are grown by the Forest Service each year for use in the reforestation of denuded lands on the National Forests.

burned over 10 acres, and only 4.4 per cent caused a damage of more than \$100. The chief opportunities for further progress lie in reducing the number of fires that occur, and in this work every citizen can help. The water user in particular should be among the very first to co-operate in keeping down fires. His prosperity is intimately bound up with their suppression.

Necessary precautions are likewise taken to keep in check insects and diseases which would endanger the forest cover on watersheds in the National Forests.

When the boundaries of the National Forests were first drawn it was inevitable that occasional areas of land more suitable for farming than for timber production or watershed protection should have been included. To make certain that all of the lands within the National Forests will be put to their best use thorough surveys were made by experts, as a result of which the lands have been classified according to their primary value for timber production, watershed protection, agriculture, and the like. In making this classification, one fundamental prin-

ciple was followed, namely, that land chiefly valuable for the prevention of erosion or the regulation of stream flow should be retained in the National Forests and administered primarily for these purposes. Such other lands as appear to be more valuable for crop production have either been eliminated altogether from the National Forests or else opened to entry under the Forest Homestead Act. It sometimes happened that areas were encountered which were of value both for farming and for watershed protection. When this was the case it became necessary to determine their relative value for the two purposes. The fact that throughout the West water is such a precious commodity ordinarily led to the classification of such tracts as primarily valuable for watershed protection. A good example of the way in



TREE PLANTING ON THE PIKE NATIONAL FOREST, COLORADO

This is the watershed from which Colorado Springs derives its domestic water supply. About 10,000 acres are reforested each year by the Forest Service, mainly on watersheds from which towns and cities and irrigation projects derive their water supply.

which this works out in actual practice is afforded by the Angeles National Forest in southern California, which is the main source of the water supply for millions of dollars' worth of citrus groves and other irrigated lands in the valleys below. These lands, which owe their high

productiveness entirely to irrigation, are many times more valuable than the rather mediocre lands within the National Forest, even when the latter can be cultivated successfully. Consequently, all of the land within this National Forest, much of which is easily eroded, has been classified as primarily valuable for watershed protection wherever there was any danger that its cultivation might cause erosion or changes in stream flow that would result in damage to the irrigated lands below.

The same principle also applies in the case of lands primarily valuable for municipal supply or for hydro-electric projects. Out of the 12,000,000 acres of land in the Western States that have been eliminated from the National Forests or opened to entry in the last five years, practically none are primarily valuable for watershed protection. The water user and his needs have been given first

consideration. Within the National Forests is a large part of the western summer stock range. Before the creation of the Forests, this range had been so badly

trampled and so heavily over-grazed that its carrying capacity had been seriously decreased, and, what was worse from the standpoint of the water user, the protective influence

of the surface cover of grass, shrubs, and small trees had been largely destroyed. In many localities over-grazing had been the cause of severe erosion, disastrous floods, and reduced stream flow during the dry season.

Grazing in the National Forests has been regulated in such a way as to repair such damage to the fullest possible extent and to prevent similar damage on areas not already affected. Not only has grazing been restricted in certain localities, but new methods of handling the stock have been introduced. In the case of sheep, for example, the old method of grazing them in large, compact bodies and bringing them back night after night to the same bedding ground, which proved so in-



REGULATED GRAZING ON THE NATIONAL FORESTS

Upper.—Sheep grazing on the Santa Fe National Forest, New Mexico. Approximately 7,500,000 sheep use the National Forest range each year. Damage to the vegetative cover is prevented by limiting the number of stock to the carrying capacity of the range and by proper methods of handling, such as open herding, illustrated in the picture.

Lower.—Cattle grazing on the Santa Fe National Forest, New Mexico. Approximately 2,000,000 cattle and horses use the National Forest Range each year. Full utilization of the range is secured by the proper development of water holes and salting grounds.

jurious to both forage and soil, has been replaced by handling them in smaller, more open bands and by bedding them down wherever night overtakes them. Cattle

are prevented from congregating too much by a proper distribution of salt and the development of watering places at the higher elevations and on the less frequented parts of the range. All stock is kept off of the range until the ground is firm enough not to be cut up by trampling. Where necessary, no grazing is allowed until the grass and other herbs have had a chance to seed. By such measures as these the water user is protected, and at the same time the grazing industry is benefited. Under the improved methods the range is, in fact, being built up to a point where it can carry larger numbers of stock than before and still afford protection from the twin dangers of erosion and irregular stream flow.

In cutting timber on the National Forests, similar precautions are taken to see that the interests of the water user are properly protected. Destructive lum-

bering, which too often stripped the land and abandoned it to fire, with entire disregard not only of the future timber supply, but also of the water supply, is now a

thing of the past, so far as the National Forests are concerned. In its place has been substituted a system of management which assures the preservation of the forest

cover and of its protective influence. At the higher elevations, where because of thin soil, steep slopes, and heavy precipitation the preservation of a fairly dense forest cover is particularly important, "protection forests" may be set aside in which little or no cutting is allowed. At lower elevations the amount of cutting that may safely be allowed naturally varies more or less with local conditions. In each case a careful study of the situation is made, and the timber is never thinned below the point of safety. Lumbering is carried on with the primary object of improving the forest and keeping it continuously productive. So far as possible, new growth is secured by natural reproduction from the



ONE METHOD OF STREAM CONTROL

A costly substitute for brush and forest cover. These check dams are part of a series of approximately 400 dams constructed in Haines Canyon, on the Angeles National Forest in Southern California, at a cost of some \$6,000,000, in order to control the floods resulting from the complete burning off of the protective brush cover.

old trees left standing. Areas burned over before the creation of the National Forests need to be planted to trees and many difficulties are encountered in this work.

TRAVELS OF AN ENGLISH CHRISTMAS TREE

BY CLARA L. WEST

IT was the day before Christmas in England—in the south of England, where the belated roses lingered here and there in the gardens, and the snow melted as soon as it fell.

The family at the Hall, an old country seat, decided that it was time to bring in the tree. Now the trees on an English estate are considered very valuable. The "lop and the crop" of the trees are used for kindling, that is; the cuttings made by the woodmen, and the small branches which fall of themselves. But to cut down a tree—that is a matter requiring the greatest consideration. So, it was quite an event to go into the woodlands, with the Lord of the Manor, who had the right to cut down, or dig up, any tree he pleased.

The Squire, the guests, the children of the whole place, even some of the house servants, went with the gardener and the woodmen in search of the Christmas tree.

It was a fit tree they wanted—not too large, nor too small. When they came to a fine strong tree, they stopped, and all made a circle around it.

"Shall you chop it down now?" asked the American, one of the guests.

"Chop it down!" exclaimed the Lord of the Manor.

"Chop it down!" echoed the gardener, in great surprise.

"Chop it down!" cried the children.

They were all thinking of it as a live greenwood tree—but the American only thought of it as a framework to be dressed as a Christmas tree.

"No—we shall dig it up," said the squire;

"Yes—dig it up"—agreed the gardener;

"Dig it up"—repeated the children.

While the American wondered what difference that would make: But, that was all the difference in the world, as you shall see, for it saved the life of the tree.

The gardener measured the earth from the trunk of the tree to the circumference of a circle around it, staking it off with bits of wood, working just as if he were going to transplant it. Then the woodmen dug it up, roots and earth, and planted it in a great tub, like a washtub, which really looked like a giant's flowerpot. After that the tree was hoisted into the cart driven out of the forest, across the park, to the house. There they placed the noble fir tree in the middle of the great entrance hall. And this was the tree's first journey into a world outside of the green-wood.

The Yule log was already in the great fireplace, ready to be lighted. Holly and mistletoe boughs garlanded the chimney-piece and the old portraits in the Hall. And on the wainscoting of the walls there were curiously carved panels, representing scenes from English history, and old customs. One of them was about the "Making of Pinnes." It represented a man

kneeling before Queen Elizabeth, with many quaint round-headed pins stuck in a cushion. The Queen looked in surprise at these wonderful things. Underneath was carved in old English letters:

"How ye makynge of pinnes was firste done in a righteous and discreet manner in Gloster Citee. For ungodlie men, seekynge only their present gain, fixed ye head without steadfastnesse, and fools, of their folie, made ye point with dust of Qud (?) that left it malign unto them that were wounded withal!

"Whereupon Elizabeth, our Queen, gave right of patent unto John Tilsby, our citizen, who avouched and shewed proofs that he made espingles (pins) with truth and knowynesse."

And so, it was this John Tilsby who was kneeling before the Queen showing her his good Gloucestershire pins. But no one paid much attention to the treasures in this old house—the carvings, portraits, and the wonderful porcelain collections, because the tree was waiting to be dressed. It was a real live tree, remember, with its good roots still feeding it.

Before dark the family came with hammers and tacks, and green branches, and they covered the tub, with evergreens and holly, until not an inch of the wood could be seen. After that, the red apples and oranges were tied on, to properly weight the branches—then the gilded and silvered walnuts, and many colored shining balls, paper butterflies, gold and silver birds and fishes, bon-bons, and Christmas boxes of candies (which they call "sweets" in England), and mysterious small packages for special people, tied up in gay papers. Then much glittering tinsel thread, called "Angels Hair," and paper posies. Then they put on some little glass bells, which made a cheerful tinkling sound whenever the tree was shaken. But no popcorn, because there is none in England, and no strings of red cranberries, for the same reason. The wax tapers were then put in place, red, blue, green, yellow, white and pink. And to crown it all, at the very top, they placed a big, dazzling, gold star, with many candles around it so that its shining could be plainly seen. All the large presents for the household were placed under the tree on the earth, covered with green. It was done! How fine it looked!

There the tree stood all night long, until the dawn. Very early the chimes of the village church began to ring in the Christmas morn. On and on they rang, for there were eight bells in the parish church tower, and it took nearly two hours to ring in all the changes.

The tree heard all this!

Presently a footman brought in a red bench—and placed it on one side of the hall. Then another, and another and another. They were red-cushioned benches and looked very gay. Then the man looked at the

clock, and went away to strike a gong. After the gong stopped sounding, there was a silence—a great stillness, in the house, for a time. Then the patter, patter, patter of footsteps coming down the great stairway announced the arrival of the family and their guests. "Merry Christmas" was heard on all sides. The master of the house pulled a bell, and the procession of house servants entered, headed by the housekeeper and butler, and took their places on the red benches. The family and friends were in groups near the fireplace and in the window niches. The lesson for the day was read, and the Christmas prayer said. And the Tree, in all its glory stood in the very middle of everything. Surely it had never been in such company before. And, afterwards when, amid much merry-making, the presents were given and taken, the tree had to part with some of its fine trimmings, while the little glass bells tinkled joyfully as each package was pulled off.

But hark! There were singers just outside the door:—

"Come fill the house with song and glee
With mistletoe and holly tree
For Christmastide is here."

There they stood, the children of the estate, with their fresh young faces, all dressed in their holiday clothes, singing the Christmas carol. When they had finished, they were called into the house, and each given a Christmas box.

The tree saw wonderful things that day: the carol singers, the bell-ringers, the finely dressed guests for the great dinner, the crackling Yule log, and all the fine presents spread around the hall.

The travels of the tree went on after Christmas day, for, the next morning many of the decorations were taken off, but not the glittering tinsel, the paper roses nor the great star. The cart came to the door, and took the tree down to the village school house. What a fine ride through the frosty air! The school children were to have a treat and the tree was again dressed. This time with many bags of candy and toys. All were tied so that the children could see them and talk about them. More wax candles—and some big round cakes with a hole in them through which the string to hang them on was tied. The children had a fine feast and a magic lantern show—then they sang a carol, and marched out passing the tree, each child getting a toy and a bag of candy and a cake. So, at the end of this evening the tree stood quite bare except for the tinsel, the paper posies, and the star.

One more journey the tree was to make before it re-

turned to its home in the forest, for it was going back to be planted again, and go on growing.

This last journey was to a hospital, in the Cathedral town. Once more the cart arrived and carried off the tree; and, as it rolled down the quaint old street, some children shouted "Ha! Look at the star—there goes a Christmas tree a-riding!" Again the traveling tree had to be dressed, and this time in a room where all the people were in little white beds trying to rejoice because it was Christmastide, although many were ill and sorrowful. The star shone out in all its splendor, and the fir-tree with its new decorations, stood up straight and strong, because its roots were firmly planted, and there was earth to nourish them. Nobody was afraid that the tree would fall over—it was not possible, with such a foundation, and besides it was alive!

Even Christmas festivals come to an end, and so, one morning the tree was made ready for its last ride in the cart. Then the glittering star came off, and the tinsel, and even the paper posies.

The children of the old estate eagerly watched the country road for the return of the tree. When it entered the park, the children, indeed everyone in the house, rushed down to meet it and go with it into the woods. And one of the children said. "Let us hang one of our glass bells on the tree and then it will tinkle when the wind blows." And so they did.

The gardener and the woodmen took the tree back to the very place from which they dug it up. There was the great yawning hole, and when the woodmen knocked off the staves of the tub, the tree was planted back into its old home, ready to go on growing when its roots should strike out again into the earth.

It was a proud tree, for it was not only a fir tree, but a Christmas tree, and a traveled tree, which had seen the life of creatures outside of the greenwood. When the wind arose the little Christmas bell tinkled as if to wish good cheer to all the birds of the woodland.

The children of the old place delighted to walk in the woods for they knew several trees which, from time to time, had been their Christmas trees in the Hall. Sometimes they would stop and exclaim "Look at this date," showing the metal tag with the date of the journey of the tree out of the forest.

And all this shows that it is better to have one live tree for three festivals, than to cut down, and kill, three trees for the same purpose.

This is a true story, and happens each year in a place in Southern England.

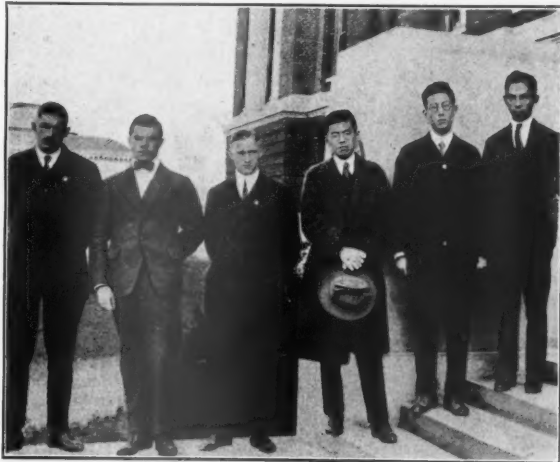
STATE FLOWERS OF MARYLAND AND WEST VIRGINIA

THE American Forestry Association has received a letter from Mrs. T. R. Payne, of Baltimore, Maryland, in which she says: "It gives the Halten Garden Club, of Baltimore County, great pleasure to announce that Maryland has a legalized state flower, the Black Eyed Susan (*Rudbeckia-hirta*). We thank you for your assistance in the matter and hope you will add

our state to your official list." And another from Mayo Tolmon, chief engineer, who says: In an article in the *Boston Transcript* I noticed you gave the state flower of West Virginia as the Indian Paint Brush. The state flower of West Virginia is the Rhododendron. It was chosen by the children of the state and legalized by joint resolution of the legislature.

FOREIGN STUDENTS OF FORESTRY IN AMERICA

STUDENTS from Sweden and the Philippines, both for advanced work, and other students from China and Canada have been sent to the United States to secure training in forestry, marking an advanced step in the international application of the principles of reforestation of barren areas, and the beginning of cooperative studies along reforestation lines between various nations. This acceleration of the training of men in the great out of



FORESTRY MEN FROM FOREIGN SHORES AT SYRACUSE

Reading from left to right: F. B. Mann, Lindsay, Ontario; A. E. F. Schard, Stockholm, Sweden; H. J. MacAloney, Halifax, N. S.; Mark Y. C. Hwang, Kiukiang, China; Chia Choung Tong, Tien Tsin, China and Luis J. Reyes, Manila, Philippine Islands.

doors profession is the direct result of the war, which caused a realization of the need of the world for trees and timber. Six foreign students are registered this year at the New York State College of Forestry at Syracuse, four in undergraduate work, and two in advanced study, in addition to a larger entering class than has ever before been known in the New York institution. The foreign students come with an unusual record, particularly in two instances, where they are sent by authorization of foreign governments for advanced study. The six foreign students of the New York State College of Forestry at Syracuse are: A. E. S. Schard, Swedish Royal Forest Service, American Scandinavian Foundation exchange fellow from Stockholm, in interchange with Henry M. Meloney, of the New York College, sent to Sweden by the Foundation. Luis J. Reyes, assistant Wood expert of the Philippine Forest Service, graduate of the Insular Forest School of the University of the Philippines, and for the last six years with the Philippine Forest Service. Mark Y. C. Hwang, Kiukiang, China, member of the junior class, sent here through authorization of the Chinese government, to learn how to assist in the reforestation of China. Chia Choung Tong, Tientsin, China, a freshman here for study under the same conditions as Mr. Hwang. F. B. Mann, Lindsay, Ontario, member of the freshman class, in America to study for future practical work in the Dominion.

NATURE IN THE NUDE

THE frosts, the rains and the boisterous blasts have stripped the trees of their green robes of summer and they stand naked—but unashamed.

The leafy tent which the big maple made in your doorway last June is now but a tracery of twigs against the sky. Its delicate fret-work is for the most part as rigid and motionless as if stamped from steel, for it no longer invites the vagrant zephyrs for a romp, and even the northern gale drives through its skeletonized body with almost as little resistance as a ghost would offer.

Yet it is still beautiful. We can now study the great limbs of which there was no hint beneath its summer drapery; the huge, swelling muscles where the limb joins the trunk, the point of greatest strain. Note, too, in the case of the forest maple, the perfect balancing of weight, which is the secret of the straight, columnar bole.

Observe how the oak throws out great, brawny, horizontal branches which suddenly turn and lift skyward, with an abrupt taper, in order that the multitudinous leaves of the growing season may receive their share of sunlight. The branches of the elm, on the other hand, shoot upward first and then turn their tips outward and downward, like a waterfall. But the same end is secured.

If you learn the trees in the spring and summer, with leaf, flower and fruit as your guides, you must learn them all over again in the winter. It is a bit baffling at first, for most botanical manuals seem to assume that trees are to be studied only when in verdure. But it's all the more fun for that.

Now the only clues in your arboreal detective work are the bark, both as to texture and color; the habit of branching; the twigs, by their alternative or opposite position; the leaf scars and the shape, size and color of the buds, which some people may be surprised to learn are all finished before the first frost.

But soon you come to recognize a tree just as you do a friend—instinctively, as it were, with no cognizance of details. The contour is sufficient, and you may in time rival James Russell Lowell, who implies in one of his poems that the etching against a moonlit sky enabled him to name any New England tree.

And it is true that trees look more alike in summer than in winter. In their winter nakedness nothing is concealed; their individuality is blazoned to the discerning eye. The infinite variety of nature in accomplishing the same end is revealed.

Trees, then, become more than trees to us. They become living entities, and we begin to imbue them with the aspirations and sentiments which we ourselves cherish. We begin to understand why John Muir was charged with thinking more of a tree than of a man, and we can enter into the spirit of John Burrough's reputed retort: "Well, why shouldn't he?"—(Reprinted by courtesy of the *Chicago Evening Post*.)

A CHRISTMAS WALK WITH BIRDS AND BEASTS

BY A. A. ALLEN, PH. D.

ASSISTANT PROFESSOR OF ORNITHOLOGY, CORNELL UNIVERSITY

IT WAS Molly Cottontail that started us off. Her clean-cut tracks across the yard and up the hill toward the edge of the woods invited us to follow and learn her story of the night before. There had been a light fall of snow the previous day and the night had been quiet with a bright moon inviting all of the wood folk to come out for a frolic. Every action was recorded by the tell-tale prints of their feet in the snow and all



THE TRAIL OF MOLLY COTTONTAIL

This record tells us that she was traveling slowly and stopped twice to look around.

previous records that ordinarily would have confused the story had been erased.

What a day for a tramp it was; cold but quiet, and the crisp air sent the blood coursing through our veins and brought the color to our cheeks. Up the hill we went following the route that Bunny had taken. She had crossed the yard at a pretty good pace; we could tell because her tracks were far apart and the prints made by her front feet were far back of those made by her hind feet. When a rabbit hops, its front feet strike first, usually one in front of the other, but the momentum of its body carries its hind feet further forward than the front ones and they strike side by side. Indeed this is true of all hopping animals whose hind legs are longer than their front legs, and it is true of other animals as well, when they gallop. With squir-

rels and mice the front feet usually strike side by side like the hind feet. When Bunny reached the hill her pace slowed up and her tracks were much closer together. We could see where she had stopped for a moment to look around for there were two little marks of her front feet in front of those of her hind feet. She did not rest, however, for there was no mark of her body in the snow. She probably realized she was too conspicuous in the moonlight against the glistening snow to stop long, for on she went to the berry patch just over the top of the hill. Here she delayed for some time nibbling the tender shoots. Several times she had hopped away from the patch for several rods only to return again. We thought she might still be hiding somewhere in the thicket but when we counted the number of tracks going in and coming out there were as many leaving as entering, so we knew she must have gone on. A wider circle about the patch showed us a clean cut trail leading toward a brush pile at some distance and there the



WHERE BUNNY STOPPED TO LOOK AROUND

The pair of circular marks in the center of the photograph were made by the rabbits front feet when she stopped for a moment between jumps.

trail ended. Now for the fun. The first jump on the brush pile gave no response but with the second, there was a slight crackling of the sticks in the far corner and, the same instant, a little ball of brown fur surmounted by the sauciest, fluffiest white tail went bouncing across the snow toward a not distant woodchuck hole. Here Molly Cottontail had had occasion to take refuge

before and no doubt the blessed haven was well fixed in her rabbit memory though it was now almost concealed by snow.

The woodchuck hole was on the edge of the woods and near it was an old oak that we knew to be the home of a frolicsome family of red squirrels. How busy they had been storing acorns last fall and scolding the blue jays and the redheaded woodpecker that competed with them for the fruits of the great tree, but this morning all was quiet. We were about to believe that they were not yet up when we noticed the numerous trails leading



A HUNGRY RED SQUIRREL

Squirrel tracks resemble small rabbit tracks but the front feet always strike side by side.

from the base of the tree in all directions and we knew that we were the laggards. The tracks looked something like small rabbit tracks but the marks of the front feet were always side by side no matter how fast the little animal was traveling. Most of the tracks led out from the base of the tree for a couple of rods to small holes in the snow where the squirrel had dug down for acorns and then they proceeded back to the tree again where he could eat in safety. We wondered how he could remember where each nut was when the ground was covered with snow for he never seemed to make a mistake. Every track was full of purpose, going directly to the spot where the treasures were hidden.

Not so business-like were the tracks of the little deer mouse coming from a nearby stump. Perhaps he had all his stores for the winter hidden in the roots of the stump and came out just for exercise, for though we followed his tracks all about the corner of the woods, we could not discover his particular errand. We knew it was a deer mouse that lived in the stump because of the long hops and the marks made by his long tail in the snow. Occasionally when climbing a hill he apparently held his tail up from the snow so that his tracks looked very much like his cousin's, the meadow mouse, but as soon as he

started down the other side, the long slits in the snow announced his identity. The only other long-tailed mouse that lived in the vicinity, the meadow jumping mouse, we knew was safely tucked away in a snug little nest for his winter sleep. There were other deer mice living in this woodland and all had apparently been out the night before passing and repassing each other so that their trails often made a network of tracks. Sometimes they led up to the base of a tree and did not return so we knew the little mouse had climbed the tree like a squirrel for sheer fun and finally had scrambled down a grape vine that hung from one of its branches. One deer mouse track led up to a bush containing a song sparrow's nest that had been roofed over with shreds of bark and grasses, and when we touched it, a tiny yellow-brown head with two big black eyes and two big ears popped out of a hole in the side as if to say, "Hello, who's there?" Then, terrified by the size of her callers, she leaped to the ground and disappeared under a log.

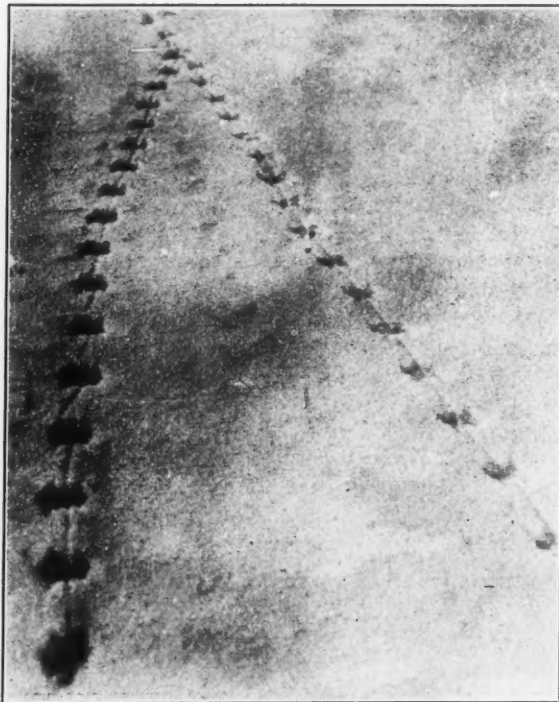
Here and there in the woodland we found shallow furrows in the snow leading into burrows that ran just beneath the surface and then out into furrows again as though the little animal that made them did not know or did not care whether he ran on the surface or burrowed



MAKING TRACKS

This shows how the tracks of the cottontail are formed: the front feet, one behind the other and both behind the larger hind feet that strike side by side.

beneath it. This we knew to be the trail of a short-tailed shrew whose tiny eyes can probably scarcely tell day from night. He is about the size of a small mouse but his fur is short and dense and gray like a mole's and his nose is very pointed. Unlike the mole, however, his front feet are not enlarged and the footprints that he leaves in the bottom of the furrow as he patters along are small and equally far apart. In spite of his small size and apparent blindness, however, he is a wicked little beast for he follows the deer mice and meadow mice into their burrows where he corners them and mercilessly kills them with his needle-like teeth. Such an appetite has he that he seems to have no difficulty in disposing of an entire mouse much larger than himself for he leaves only the



COMING AND GOING

The trail of a deer mouse in soft snow. The separate marks of front and hind feet cannot be distinguished but the mark of the long tail behind each track is clearly defined. Which way did he go?

skin turned neatly inside out. He seems equally at home in the woods and the fields and on this day we found his trails almost as frequent as the tracks of the mice, perhaps because the mice do a good deal of their running on the surface of the ground beneath the snow.

Especially is this true of the fat little meadow mice that seem to have difficulty in jumping in the soft snow and prefer to burrow through it. In places where the snow was hard, however, their tracks were plentiful enough,



THE DEER MOUSE

His large eyes, big ears, rich yellow-brown upper parts and snowy white underparts make him a most attractive little beast. He is also called the white-footed mouse.

looking like miniature squirrel tracks, the short tail only occasionally striking so as to leave a mark. So many enemies have the meadow mice that it is little wonder that they scarcely dare show themselves above the snow. The hawks by day, and the owls, racoons, weasels, skunks, foxes and cats by night combine to keep him ever on the alert. At this particular time, however, he had little to fear from coons or skunks, for the weather had been cold for weeks and they were snugly asleep enjoying their partial hibernation and waiting for a few warm days and nights to awaken them.

We noted, however, that the weasels were out for we followed the paired tracks of one back and forth along the edge of the woods, observing how it had loped over the surface and burrowed beneath by turns. Never a brush heap or a stone pile was passed by the inquisitive beast without a thorough exploration of all its nooks and crannies for some shivering mouselet. We knew that he was not entirely nocturnal in his explorations and as the tracks were still fresh we kept our eyes ahead for the slightest motion. During the winter the weasel's



HAS MANY ENEMIES

The hawks by day and the owls, cats, weasels, foxes, racoons and skunks by night combine to keep the little meadow mouse ever on the alert.

coat is pure white except for the black tip to its tail and one has to look closely to see this or his beady black eyes and muzzle when everything is white. At last the tracks led to a pile of logs and did not lead away so we knew that he was somewhere beneath. Instead of turning over the logs to hunt for him we sat down near one end of the pile knowing that if his natural inquisitiveness did not bring him out, a few "squeaks" would. Somewhere in the distance a flock of crows were mobbing a sleepy owl and a couple of blue jays screeched their displeasure over the presence of a squirrel in their favorite tree. But close at hand all was silent save for the lispings peeps of a few chickadees hunting about the tips of the hemlock branches. We had not long to wait. A feeling gradually came over us that we were being watched and sure enough, a slight movement of something drew our atten-

tion to two shining black shoe buttons in a crevice and a tiny black muzzle which quivered slightly as though it did not like the smell that was being wafted in its direction. The animal, itself, we could scarcely distinguish from the snow all about it. When the eyes suddenly disappeared, considerable of the snow disappeared with them and we knew that we had seen more of his lordship than we realized. Not a sound did we hear in the log pile but suddenly in an entirely different place we perceived the shining eyes once more gazing intently at us. Several times he appeared and disappeared as though he were playing a little game with us, so we thought we would respond. I put my hand to my lips and gave the "young bird squeak" that is so successful in drawing birds during the nesting season. In an instant his entire attitude changed. Out popped his whole



A MEADOW MOUSE SPEEDWAY

When he ventures into the open, the meadow mouse is exposed to many enemies and must put on the high gears. He lost no time in crossing and recrossing this open stretch.

serpent-like head and shoulders, his head turning first one way and then the other and his little muzzle sniffing the air to detect the whereabouts of the breakfast that his ears had just heard. Back into the logs he went and then out of another crack much nearer. He was all attention and his little muscles seemed to quiver with excitement but his offended nostrils told him that there was nothing near but his huge and dreaded enemies, and, after a few more passes, he disappeared.

Our path now led us to the creek which was frozen over except in the swiftest places. Out from one of these led some broad pigeon-toed tracks with an uninterrupted clean cut furrow following between them that we knew could have been made by none other than "Major Muskrat." Where the snow was a little deeper his body made a broad furrow and always his heavy flattened tail cut down into the crust behind him. He apparently was not bent on feeding for his tracks merely lead to the next hole in the ice and cloudy water streaming from a hole



THE BURROWS OF THE SHORT-TAILED SHREW

His minute eyes seem barely to distinguish light from dark and he furrows the surface or burrows beneath without seeming to know the difference.

in the bank told that he had not disappeared very long before and was still inside his burrow. Down in the marsh his brothers had built a nice warm house like a beaver's, but this creek-dwelling muskrat had to be satisfied with a hole in the bank.

Crossing a stubble field we could see where a flock of



"THOUGH SHE BE BUT LITTLE, SHE IS FIERCE"

The weasel is a blood-thirsty little beast and is never more vicious than when caught in a trap. In the north, its fur is white in winter and the best grades are known as "ermine." In the summer its fur is reddish brown.

crows had held a breakfast party, digging down for the corn cobs which they had stripped of nearly every kernel earlier in the season. A delicate tracery on the snow beneath a patch of ragweed showed where some small birds had been feeding and the position of the tracks one



A PHEASANT PASSED

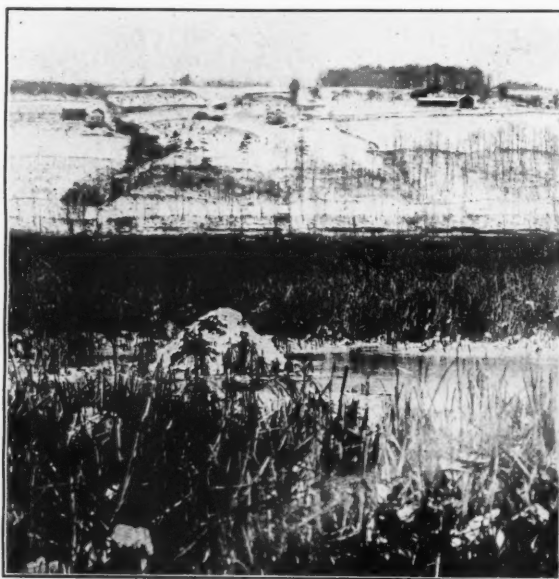
The front toes are set at a wide angle and the imprint of the hind toe is a mere dot. The tracks are clean cut and the toes do not drag.

behind the other and the marks of a long hind toenail proclaimed that a flock of horned larks had paused to feed there.

Along the edge of the field a row of large angular tracks announced that a much larger bird had gone by. The three front toes were set at a wide angle and the imprint of the hind toe was a mere dot. The tracks were clean cut and the toes did not drag so we knew that a pheasant had passed that way. We followed his trail through a clump of weeds and then down a little gully through some burdocks where he had apparently stopped for a few moments to feed. Then he continued his

course to a patch of deadly nightshade whose red berries with their belladonna held no fears for him, for we could see where he had jumped after some of the berries that were just out of reach. He apparently had had a good meal, for his tracks then led off into a tangle of sedges where he jumped up almost from under our feet and got away with a great crackling and whistling of wings.

Nearly every sheltered spot held some surprise for us that morning for the happenings of the previous night were plainly written in the snow diary. It mattered not that we had actually seen only a few of the little creatures for we could easily imagine them present and could reconstruct their lives from the records which



THE HOME OF THE MUSKRAT IN THE MARSH

Along the creek the muskrats live in burrows but where material is available they build these beaver-like houses.

they had left. We had seen only a few birds and only three animals but we returned home with the feeling that the woods and fields were teeming with life and that after all a walk at Christmas time could be just as full of interest as one at any other season of the year.

THE ANNUAL MEETING

The annual meeting of the American Forestry Association will be held at 2 P. M., Tuesday, January 13, 1920, in the Assembly Room of the Merchants' Association, Woolworth Building, 233 Broadway, New York City.

There will be no forestry program. The meeting will be confined to business matters and the election of officers.

Later in the year the directors will decide upon the advisability of holding a national forestry conference for the discussion of forestry problems.

AIRPLANE FOREST FIRE PATROL IN CALIFORNIA

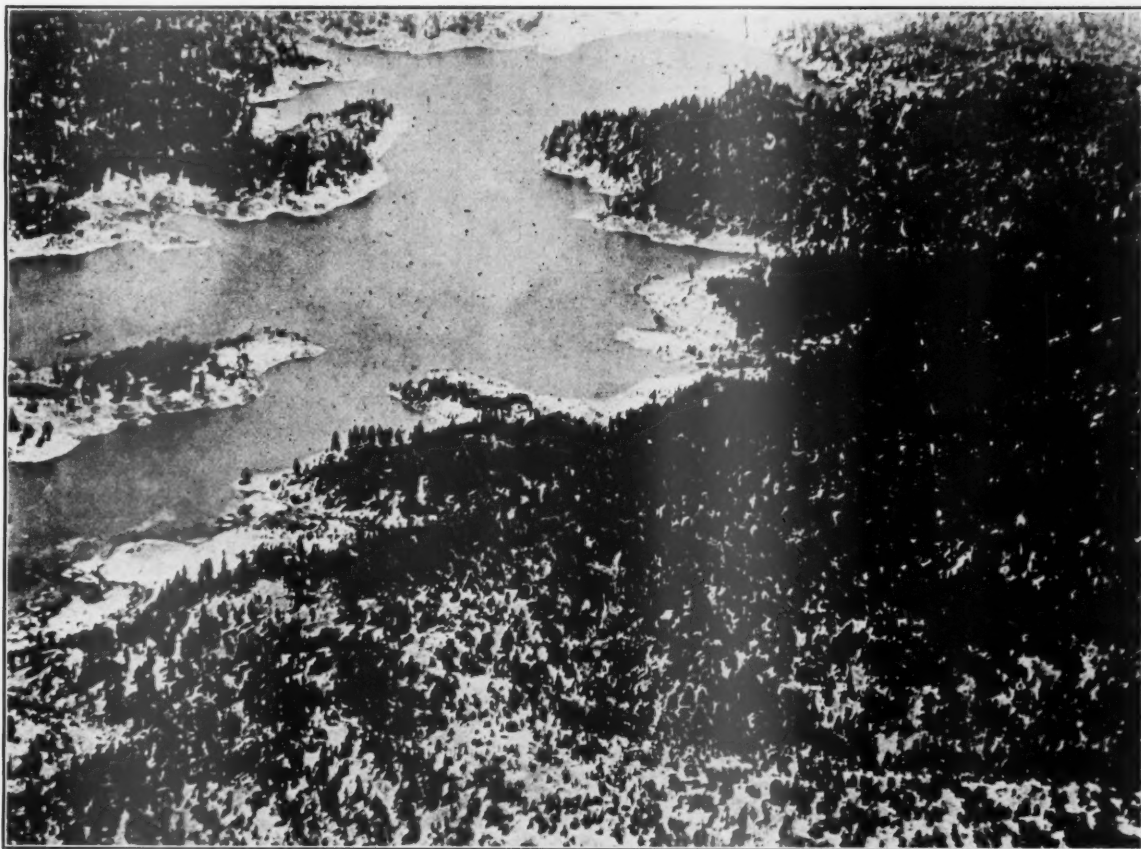
BY R. F. HAMMATT

THE first organized and sustained airplane forest fire patrol ever attempted in the United States (or elsewhere, so far as is now known) was inaugurated on June 1, 1919, in California. The work was undertaken at the request of the Federal Forest Service. It was performed—and is still being performed—by the Air Service Branch of the War Department, with Air Service personnel and equipment, and at Air Service expense. Its aim, in addition to providing the training, practice and experience which must be given the personnel, was to see how efficiently forest fires might be (a) discovered, (b) located, and (c) reported to the Forest Service organization. Six patrol routes, covering National Forest areas of high values, were laid out, and twice each day six Curtis J. N. D. planes covered the better part of some six million acres of rough, mountainous, heavily timbered country. The average non-stop run was 160 miles—the average round trip, 320 miles.

For the months of June, July, and August uninter-

rupted daily service was continued. A total of 745 flights covered 92,605 miles, and discovered, located and reported a total of 118 fires—23 of them being both discovered and reported in advance of the regular Forest Service detection organization, which was still on the job. The only reason, apparently, why more fires were not reported *first* by the air patrol was because neither ships nor ground stations were equipped with wireless. But before discussing this matter, as well as other valuable services rendered by the Air Patrol, let me give you, rather roughly, some of the conditions surrounding the work, and a little idea of the extension and reorganization of the patrol during the month of August.

Landing fields at the end of each patrol were provided, in each case, by the city or town authorities or by some local boost organization. To be satisfactory, such fields had to be level or with a constant grade not over three per cent, smooth enough that a Ford could be run over them at 25 miles an hour, 2,000 feet long, and 600 to 800



Photograph from Western Newspaper Union

HOW UNCLE SAM FIGHTS FOREST FIRES FROM THE AIR

How the forest looks from the air. This is what the observer continually sees until suddenly he spies the dreaded puff of smoke. He immediately uses his wireless and flashes the alarm to put the machinery of forest fire control into action.

feet wide. They must, too, be free of obstructions, such as telephone poles, wires, trees, etc. Facilities for gas, oil, and water must be on the field itself. Automobiles to transport pilots and mechanics from field to town were furnished by local authorities. Guards, to watch the planes while the aviators were at lunch, were provided by the Forest Service. Telephone communication with the field was also supplied. Meals while away from headquarters were provided by the State Forester. Special flying maps were prepared and furnished to the aviators, and lookout stations on the patrol routes were numbered, both on the map and on the ground, and were designated as control points to report daily on the movement of the planes. Certain members of the Forest Service were designed to act as liaison officers, and were stationed at the flying bases. Emergency landings were to be reported by the regular lookouts, and necessary arrangements made to succor and transport the pilot, guard the plane, and guide and assist the wrecking crew. Prompt transmission of the pilots' reports was provided for, as was also a daily return report so all pilots might check their fire locations with the actual location as determined on the ground. The pilots picked, visited and mapped emergency landing fields on or near the patrol routes; reported, on request, upon the condition or progress of large fires, used (with indifferent success except from the standpoint of publicity) parachutes to drop fire messages over towns in Southern California, and experimented with carrier pigeons. Forest officers were frequently taken on the patrols, and a solid and mutual understanding of each others aims and problems was thus obtained.

On August 15, with the opening of the hunting season, the fire situation in Northern California became critical. Extension of the Air Patrol was asked, and as quickly granted. This extension and other matters, required a reorganization of the whole Air Patrol in California.

De Haviland planes—equipped with Liberty motors, and carrying 96 gallons of fuel, were substituted for the slower planes carrying much less gas and having less climbing power. Two new bases—equipped with temporary hangars—one at Red Bluff and one at Fresno—were established. New daily routes were laid out, one of which, with only two landings, covers 560 miles, and the service was extended from the original 5 to 15 National Forests in the State. Two Forests situated on the east side of the Sierras, with but little fire danger, were omitted.

Beginning September 1, eight ships are covering twice each day some 16 million acres of National Forests, and, incidentally, some four or five million acres of privately owned timber lands. Eight additional ships are used on alternate days, to allow for necessary repairs, etc., and as relief for the pilots. Sixteen pilots and 22 mechanics are assigned to the work.

To date (considering now the season as a whole) only six forced landings, with one fatality (which occurred in Southern California during a heavy fog on June 1) and no injuries to pilot or observer are of record. The damage to planes, considering the number of miles

covered, and the extremely rough country patrolled, is negligible.

No figures as to cost—either initial cost of equipment or training, cost of operation or of maintenance, are available except for such general figures that no attempt will be made to quote them. And in this connection it should be borne in mind that the factor of cost, insofar as the comments, opinions and conclusions here presented are concerned, is disregarded entirely.

Having disposed thus easily of what is probably the most vital factor in airplane forest fire patrol to all owners—including the Federal Government—of timberlands, I shall proceed with various comments, observations and opinions. They will, I hope, provoke thought and comment both from the different agencies directly interested in forest fire protection and from members of the Air Service who have, this past season, engaged so earnestly and enthusiastically in this work.

Three months' trial with airplane forest fire patrol has demonstrated that discovery of fires is right around 85 per cent efficient and can be made practically 100 per cent efficient, either by providing for a longer period of time in the air or, possibly, by better correlation between the time of flight and the times of day (as shown by analysis of fire reports) when the biggest percentage of fires start.

The effective discovery radius, if we may call it that, varies with atmospheric conditions and the altitude of the ship; but may be placed, with an altitude of 5,000 feet above the country patrolled, at not less than 30 miles. I have personally discovered new and unexpected donkey engine smokes in the McCloud country at a distance of 30 miles, and after watching, recognized them as donkey smokes.

Theoretically, accuracy of location should depend at least in part on knowledge of the country, ability to read topography, both actual and as it appears on the map, and on the map itself. Factors other than these also enter into the matter. From a layman's point of view, accurate location of fires seems, perhaps, the most difficult problem (next to actually handling the ship) of the air patrol. Actually wonderful results have been obtained by pilots entirely new to the country and equipped with mighty poor maps. I enumerate only one—Lieut. E. C. Kiel, flying a De Haviland for the first time in two months, over an entirely new route, and equipped with a G. L. O. base map, on scale of 1 inch to 12 miles, placed within $\frac{1}{2}$ mile of its actual location a 200 acre fire that was 35 miles away from his ship, and to see which he had to look almost directly into the sun. Other examples can be cited. Mr. F. A. Elliott doubtless has many at his command.

The reporting of the fires must, on the whole be classed as unsatisfactory. Parachutes with messages attached are too uncertain. Carrier pigeons released from the air, and report by phone or telegraph after landing are too slow to insure the best results. And yet, in this connection, it must be remembered that the slowness is comparative, and that comparison is made with a system of lookouts and specially built telephone

lines that have taken twelve years to install, develop, and perfect.

Wireless, either telephone or telegraph (preferably the former) should offer the solution to this, the biggest single drawback to airplane fire patrol as it has been conducted this past season. It is my understanding that sufficient equipment, both for the ships and for ground stations, is on hand within the War Department. Without wireless, or some other method of greatly hastening the report time, the airplane can never function as efficiently as does our present day lookout system; with it, provided it can be made to work satisfactorily and with a long enough radius, it seems possible that the lookout system can be improved upon and supplanted.

It has been found entirely practicable to get quicker, more complete, and more satisfactory progress reports, either on a series of small and widely scattered fires or on large conflagrations, by means of the airplane than by any other method so far tried. An observer who has had "the run of" the fires, so to speak, can size up a bunch of small fires pretty accurately from the air and, similarly he can, particularly if he be acquainted with fires and fire-fighting, determine very accurately the actions of a large fire. The airplane patrol in California has done very real service, the past season, both in making progress reports on large fires which were out of communication except by messenger, and in providing a quick, easy way for supervising officers to get an accurate knowledge of fire conditions within the territory under their control.

It is hard to over-estimate the value of the airplane as an educational factor. It is a matter which naturally lends itself to publicity in the daily press. The planes themselves attract attention. The Air Service personnel has interested itself keenly in the work, and has taken numerous opportunities before local gatherings and elsewhere to preach the gospel of fire prevention. In fact, I am inclined to believe that, considering the season just passed, we might disregard entirely the many positive results which air patrol has accomplished and still figure that the use of planes has been a huge success.

It seems possible, too, that the use of planes on patrol may have had positive results in the way of *fire prevention*. One valley on the Cleveland Forest, in Southern California, has, until this year, been a seething cauldron of fire. Ships have been flying over it twice each day since June 1, and the inhabitants understand that each ship is equipped with a powerful telescope and a machine gun. The valley has had no fires since the air patrol has been in operation. It is a fact, too, that the serious outbreak of fires in Northern California during August stopped almost immediately the airplane patrol started. The more probable explanation in this case, however, is that three arrests on federal warrants, and seven under the State law (following some of the prettiest sleuth work and third degree stuff ever witnessed) acted as the real deterrent.

And now, what about the future?

California is looking forward, first, to an airplane patrol conference which will be held early this fall be-

tween the Western Department of the Air Service, the Forest Service, and lumber and fire protection interests. A conference which will decide on the number and kind of ships to be used, the routes to be covered, where wireless ground sets shall be placed; in fact, a conference to line out the whole airplane patrol 1920 program, and to decide upon all preliminaries so that everything can be ready before the season opens.

California is looking forward in 1920 to 20 ships, stationed preferably at some four or five Supervisors' headquarters, where they will be in close and constant touch with the Forest Service organization and facilities. If such stations or home fields are not possible, then a forest officer will be detailed to each base selected.

We hope each ship will be equipped with wireless, and that sufficient wireless ground stations may be installed so that no ship will be out of communication more than 10 or 15 minutes. And speaking of wireless, we hope to have portable wireless receiving sets, so that, in case of a bad fire, we may try directing the fire fight (by an experienced forest officer) from the air. We believe the general fight, and we know that the progress of the fire, can best be directed or watched from above the timber and the brush rather than from below it.

We want to try Forest Service observers as well as Air Service observers. There is talk of depending on air patrol entirely, at least early and late.

We have, as you will gather, already asked for continuous daily airplane patrol of all the National Forests in the State, and let me add that, if District Forest, State and County lines are forgotten, the problem, from the standpoint of the Air Service will, I believe, be considerably simplified. We hope to amplify the progress report work and to—but why go on with all our hopes? Whatever we do, we are going to have carefully thought out and collected statistics, so as to be able to prove definitely many of the points about the work which are not now capable of absolute proof.

And now just another word. Is airplane forest fire patrol a cure-all, a panacea, a remedy for all the ills to which the forest is heir? By no means. Will it make any saving in man power? It certainly has possibilities along this line—good possibilities—and it behooves everybody, during these times, to watch and to foster all measures offering such possibilities. Is it financially feasible? If it requires an investment in equipment and personnel on the part of any outfit not now equipped with both material and men, probably not. But the War Department has both, must keep both and must train new men and keep its personnel in practice. Airplane patrol offers an opportunity for training which can't be beaten. With such co-operation as has been secured this past year, yes, it is financially feasible.

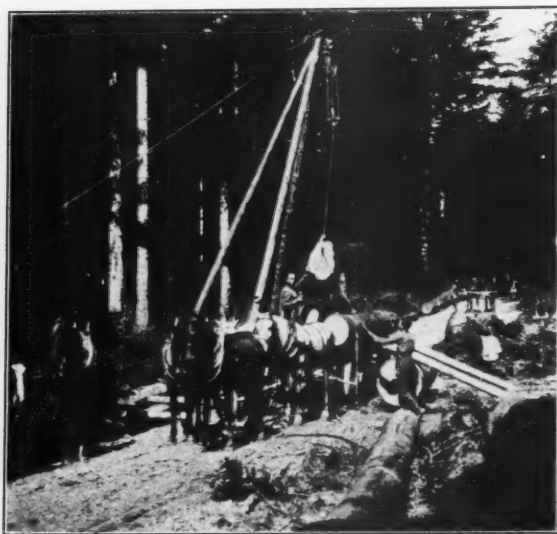
Is it a mechanical success? Yes. Refinements only in detection and location are necessary. Better methods of reporting so that the element of time may be reduced, are necessary before it may approach ultimate efficiency, but those methods should not be hard of solution.

And the thing that has made it a success has been the indomitable spirit—the youth, the eagerness and the ambition of the men of the Air Service. They are intensely interested in fire patrol and in performing a real service. They are a fine bunch of men—men whom we should feel proud to have associated with us in the Forest Service and the Western Forestry and Conservation Association. All honor to them, and if, as is often claimed, a separate Air Service will help to hold together and develop aviation and the aviator's spirit of loyalty, ambition and service, let us hope the separate Air Service soon becomes a reality.

THE MEETING OF NEW AND OLD WORLD LOGGING METHODS IN THE FIR FORESTS OF FRANCE

BY LIEUT. W. C. LOWDERMILK, 20TH ENGINEERS

THE work of the 20th Engineers in France has already been well described in *AMERICAN FORESTRY*. It is intended, however, in this paper to set forth some of the things of interest to an American forester encountered in the fir forests of eastern France during the progress of lumbering operations. Large cessions were made to the American Army in the fir forests of the Besancon District, in northeastern France. Eleven American operations were set up in different tracts in this region and cut an aggregate of 45 million board feet of timber, aside from quantities of piling, telephone poles, camouflage stakes, wire entanglement pickets and fuel



THE AMERICAN METHOD OF LOADING

wood, up to the time of the armistice. These operations extended from La Cluse, in the department of Ain, to a point not far south of Montbeliard, in the department of Doubs. Several more operations were in the process of development in still other timber tracts on November 11, 1918.

In this region, especially in the eastern halves of the departments of Doubs and Jura, are found probably the finest stands of silver fir (*Abies pectinata*) and Norway spruce (*Picea excelsa*) in France and even in Europe. These forests are on a par with the Black Forests of Germany, where the silver fir attains excellent development.

The forest stands are composed for the most part of silver fir, with some Norway spruce, the proportion of the latter increasing on the higher altitudes. Beech occurs only as scattered trees or small groups. The silver fir attains large dimensions, up to 125 feet in height, yielding 7 to 7½ sixteen-foot logs per tree, and up to

diameters of five feet breast high. Trees scaling 5,000 board feet were often cut by the American operations. The spruce does not attain such large diameters but its yield per unit of area is about equal to that of the fir.

The stocking is uniformly dense. On two of the largest forests of the region, namely, the forest of the Joux, in which Canadian operations were located, and the forest of Levier, the average stand per hectare at the lash calipering was for the Joux, 463 cubic meters, and for Levier, 406 cubic meters. Eliminating the volume allowed for branches—the French include the volume of the entire tree in such calculations—this would make an average stand of 35 and 31 thousand board feet, log scale, per acre. There is double this volume on some areas. On some of the parcels cut over the stand ran 800 cubic meters per hectare, or from 70 to 75 thousand board feet per acre. This total volume was not marked for cutting, of course, except in one forest, where danger from wind throw was acute. On several forests, volumes up to 50



UNLOADING LOGS AT THE MILL LANDING

thousand board feet per acre were marked for cutting. A study of the percentages of trees and volume marked was made on the first cession in the forest of Levier. It was found that the percentage of trees above 60 centimeters in circumference breast high marked on the several parcels was from 23 to 25, representing 72 to 75 per cent of the volume of the stands. Such stands furnished good logging chances.

The forests of the French Jura belong, for the most part, to the state and to the communes, or communities, scattered over the region. Only a small percentage is under private ownership. Scientific forest management,

being applied by law to all state and communal forests, is operative, therefore, for most of the region.

The effects of forest management upon the economic conditions of this timbered region is a thing that strikes an American very forcibly. The exploitation of the forests is a permanent business in each locality. The forest never disappears, for roughly, only the amount of wood grown each year is cut, and it is thus a permanent source of revenue to the inhabitants of the mountain villages. The grazing lands and the forests are the two principal supports of the mountain population. The "bucherons," or wood cutters, and the "voituriers," or wagoners, have their permanent homes in the villages, and go out to work in the same forests year after year. This feature is a direct contrast to the conditions in most forested regions of America, but it foreshadows the conditions



THE FORESTRY ENGINEERS WENT IN FOR WAR GARDENS. FRENCH WERE HIRED TO DO THE PLOWING. IT TAKES THE MAN AND HIS WIFE TO DO THE JOB

that will be brought about in the future by the stabilization of the timber industry. The French inhabitants of these timbered regions have come to feel that they have vested interests in the surrounding forests. It is no small wonder that the native "bucherons" looked with concern upon the rapid methods of logging which the Americans introduced in "their" forests. But in every case it was conceded that the American logging methods were preferable to German methods.

The French methods of logging as they have been developed under such conditions proved to be of interest to the American loggers. Of course, it is understood that these forests are under the direct care of the French Forest Service and all operations within the forests are subjected to specified requirements. But it is meant here to emphasize the status of the French lumberjack as a result of a permanent timber industry brought about by forest management. The French "lumberjack" is a

sturdy type, with fixed ideas, and brings with him to the present many of the methods of his fathers. There is not a great probability that timber exploitation in America will follow the same lines as it has in Europe.

The annual cut of a forest having been determined upon and marked by the French forest officers, the



THE LEVIER MILL, SET IN THE MIDST OF A HEAVILY TIMBERED AREA

"bucheron" comes into the forest equipped with rather primitive tools. He contracts with the timber merchant to fell and bark, and to skid and haul for so much per cubic meter. The first operation is aerial limbing to prevent damage to young growth when the timber is



SKIDDING A HEAVY CUT NEAR THE SWISS BORDER

felled. For this a specialist—a sort of steeplejack—has been developed. Equipped with climbing irons, a frail safety belt and a short handled ax, he climbs the bole of the tree up to the branches and works his way up to within 6 or 10 feet of the top. And on his way down he cuts away the branches, thus cleaning the stem. The



THE CUT-OVER AREA AFTER THE AMERICAN OPERATIONS WERE FINISHED. NOTE THAT YOUNG GROWTH REMAINS, AND A NEW STAND IS ASSURED

tree thus limbed has the appearance of a slender palm. A large number of trees may be thus limbed before felling begins. Then follow the wood cutters, who cut up the fallen branches at the base of the tree into meter lengths and stack them into "steres." The small twigs are sometimes burned, or sometimes bundled for sale. After this operation the fallers fell the tree, exercising care to throw it so as to avoid bringing down any young growth. They are efficient at this operation. When the stem has fallen it is barked—being turned by means of a powerful jack, which is the "bucherons" constant companion. The tree bole is left in the woods to dry.

The aerial limbing is a dangerous occupation. It is said that a limber rarely dies a natural death. This style of limbing cost, before the war, 3 francs, and during the war, 5 francs per tree. It is a question as to whether this operation pays in the actual amount of young growth saved. The American operations demonstrated that trees with branches may be felled so as to do no great amount of damage to young growth, as shown by the accompanying photographs. And it appears from the general opinion among French foresters, with whom the writer came in contact, that this practice of aerial limbing will be discontinued in France.

After six months or so the French "voituriers" (wagoners) came into the woods equipped with wagons, drawn by oxen, jacks, poles, blocks and chains. Whenever possible the entire tree stem is skidded to the surfaced forest roads. Skidding is done by oxen, and as

many as nine yoke may be hitched to one bole. It appears that a necessary part of the "voiturier's" equipment is a vociferous voice, which echos and re-echos through the forest as he belabors the slow-moving oxen.

The method of loading the stick when it has been skidded out to the forest road is unique. One man alone can load an entire tree. The accompanying photograph indicates how it is done. After the stick is jacked up by means of the pole and chains, the wagon gear is backed under and the stick is eased down upon it. The tree stems are hauled then to the railway station or to a neighboring sawmill. At the railroad a big overhead crane, running on a track, is used to load the entire tree lengths on cars. The tree stems are cut into lengths at the sawmills. The logs are run through jig saws, which produce good lumber, but very slowly. The mill outputs vary from 2 to 10 thousand board feet per 10-hour day. Waterpower and electric power are used most generally. In the valley about Morteau (Doubs) twenty-one such mills are in continuous operation.

French logging costs for this region before the war were as follows: For limbing and felling, 1.80 to 3.0 francs per cubic meter, varying according to the difficulties of the location. Converted into American units, this gives \$1.60 to \$2.75 per thousand, log scale. In all these costs comparisons money is figured at the normal rate of exchange—5.20. Cutting and stacking branch wood cost 1.25 to 1.50 francs per stere. The hauling cost varies between 6.70 and 7.20 francs for a haul of 15 kilometers. Converted into American units it equals



NOTE THE GROUP OF REGENERATION. A PERIOD OF NEARLY THIRTY YEARS HAS ELAPSED SINCE LAST CUTTING. THE BIG TREES ARE READY FOR THE FINAL CUTTING

\$6.00 to \$6.30 per thousand board feet, or about 66 cents per thousand board feet per mile.

A few of the important forest management considerations may be mentioned. The system of cutting in the fir and spruce stands in the French Jura may be termed a selection shelter wood, but it is varied according to the local conditions. In a few localities an exception is made, where clear cutting is dictated by shallow soil and danger of wind throw. Natural regeneration is in all cases aimed at. The shelter trees are left when the bulk of the timber is cut to partially shade the ground, and serve at the same time as seed trees. Blackberry briars or brambles hinder the natural course of regeneration. Wherever the stand is opened up the bramble



FRENCH "VOITURES" HAULING LONG STICKS TO A MILL OVER MOUNTAIN ROADS

covers the soil and chokes out the seedlings. Then follows a short cycle in which brush, such as winter berry and laburnum prepare the way for the fir and spruce seedlings. The regeneration period is, therefore, long—30 years being allowed for complete restocking. Where this will not suffice, planting is resorted to. But in some cases holes are planted up, especially where a greater percentage of spruce is desired in the stand. One small nursery for a forest of 2,000 hectares suffices for these purposes.

The annual cut or "possibility" is usually based upon on estimated growth per cent varying between 2.35 and 2.74.

The financial return from the fir forests is quite satisfactory. Taking the Levier (Doubs) forest for one example, during the period from 1905 to 1911, 32,390 cubic meters were cut per annum, selling at 560,994

francs, or an average of 11.93 cubic meters per hectare selling at 206.77 francs. Converted into American units this equals a net annual yield per acre of \$15.90. This is a good return from forest soil. The average price received for all grades of timber including material cut in thinnings was 17.32 francs per cubic meter; or in American units, \$15.68 per thousand board feet, log scale, on the stump. Such prices permit of intensive forest management. They were greatly increased during the war.

In the French Jura the American operations employed horse logging. Some of the stands were well suited to power logging, but the necessary equipment was not available. Horse jammers were used for loading on logging wagons. Delivery to the mill landing was done by horses, tractors and motor trucks. The excellent system of surfaced forest roads was of great assistance in the extraction of logs.

The great war has brought about many comparisons, and the introduction of a system of logging and milling



A NOVEL ONE-MAN METHOD OF LOADING A TREE. EQUIPMENT USED: A POLE, TWO CHAINS, A BLOCK OF TIMBER AND A POWERFUL JACK

developed in America into the well regulated forests of the Old World, with its inherited methods, proved to be interesting and instructive to both the French and Americans. But one of the outstanding facts was that even under the pressure of war needs, forests could be exploited by American methods in accordance with the silvicultural requirements of the French, and that the regeneration of cut-over forests under such methods of exploitation may be assured.

Is There a Famous Tree In Your Town? The American Forestry Association Wants To Know About It.

A DECADE OF PRIVATE FOREST PLANTING IN PENNSYLVANIA

BY PROFESSOR J. S. ILLICK

CHIEF, BUREAU OF SILVICULTURE PENNSYLVANIA DEPARTMENT OF FORESTRY

THE planting of forest trees in Pennsylvania began in 1728 when John Bartram acquired a tract of land on the west bank of the Schuylkill River, near Philadelphia, and developed a botanical garden in which he set out many forest trees. White pine, bald cypress, Norway spruce, cucumber, and several species of the oaks were among the most notable species planted. Humphrey Marshall, a cousin of John Bartram, established a botanical garden at Marshallton in 1773 and planted many species of trees and shrubs. The garden was primarily an arboretum, and its founder may be regarded as the Father of American Dendrology.

The planting of forest trees has been practiced continuously in Pennsylvania since these early beginnings by Bartram and Marshall. At no time did it cease entirely, but it progressed slowly. Most of the planting took place in gardens, groves, and parks, on estates, and by roadsides and waterways. The real advent of tree planting for forestry purposes by private owners of woodland did not, however, take place until 1910, that is, ten years

after the Pennsylvania Department of Forestry began planting trees on the state forests, and had set out over one million seedlings and transplants. The success of the planting effort on the state forests was heralded across the state, and private owners of idle land began to inquire earnestly about the feasibility of reforesting their holdings. It soon became evident that the time was at hand for the Department to launch a co-operative scheme for the reforestation of thousand of acres of privately owned woodland within the state which were entirely unproductive, or producing only a small percentage of their full capacity. An act approved by the Governor on April 22, 1909, permitted the Department of Forestry to distribute forest tree seedlings for the replanting of woodlands within the state at the cost of production. During the first year (1910) of the working of this scheme, 66,374 small trees were distributed. Five years of co-operative effort in this direction convinced the forestry authorities that fuller co-operation on the part of the state was not only justified, but commend-



Photo by G. H. Wirt

A PLANTATION OF NORWAY SPRUCE THREE YEARS AFTER THE SEEDLINGS WERE SET OUT
Trees occupy an unproductive portion of a farm. Seedlings supplied by Pennsylvania Department of Forestry.



MAKING IDLE ACRES PRODUCTIVE

A White Pine plantation four years after planting.

able. Consequently, a new act was passed and approved in 1915 which authorized the Department of Forestry to grow young forest trees and distribute them to persons desiring to plant them within the state, *the applicant paying only the cost of packing and shipping.*

The impetus which this act gave to forest tree planting by private owners of woodlands in Pennsylvania was almost phenomenal. The sub-joined tabulation shows the extent of the effort and the progress made during the past decade:

Year	Number of Trees Distributed to Private Planters.
1910	63,374
1911	25,360
1912	66,854
1913	47,770
1914	108,685
1915	115,577
1916	1,471,875
1917	1,812,997
1918	2,186,809
1919 (spring)	3,047,485
Total	8,946,876

The principal species of trees set out by the private planters are:

Conifers	Hardwoods
White Pine	White Ash
Norway Spruce	Red Oak
European Larch	Sugar Maple
Red Pine	Black Walnut
Scotch Pine	Honey Locust
Pitch Pine	Wild Black Cherry
	American Elm
	Willow (cuttings)

The planting of forest trees by private owners of woodland is now not only an established practice in Pennsylvania, but is annually extending its scope and

significance. The aggregate extent of the planting effort during the past decade is approximately equal to planting of one tree for each inhabitant of the state. The future promises a still greater development of this commendable effort, for the progressive tendency of the movement is indicated by the fact that more trees were planted during the past spring than during the first seven years of the undertaking (1910-1916, inclusive). Furthermore, more than 34 per cent of the total number of trees planted during the past decade were set out in the spring of 1919. The number of applicants has increased from 23 in 1910 to 769 in the spring of 1919, and the goal of the planting program for the spring of 1920 is 1,000 private planters.

The average number of trees distributed per applicant in the spring of 1919 was 3,963, indicating that the average applicant reforested approximately 2 to 3 acres. The applicants setting out the largest number of trees during the spring of 1919 were the Scranton Gas and Water Company which planted 164,500 trees, and the Spring Brook Water Supply Company which planted 135,000 trees. Water



Photo by W. Gard Conklin

PLANTING A WHITE PINE SEEDLING

The planting operation is simple, and one man should set out from 300 to 500 small trees per day.

companies have been the largest and most consistent planters. They began their planting effort in 1916, when six companies set out 153,700 trees. During the spring of 1919, 26 companies planted a total of 565,775 trees. While the planting by water companies extends back only over a period of four years, yet 44 different companies have already set out a total of 1,690,975 trees, that is over 18 per cent of the total number distributed by the Department of Forestry.

The most promising development of the past year is the interest mining companies of the state are taking in the subject of reforestation, 14 different companies having committed themselves to the policy of forest tree planting. They are experiencing great difficulty in procuring suitable mine timbers at a reasonable cost, and, having recently determined the probable duration of their operations, realize that it is possible to grow timber of usable size on their own holdings long before the products of their mines will be exhausted. The scope of the planting effort of a few of the mining companies during the spring of 1919 is shown in the following tabulation:

Pittsburgh Coal Company planted 60,000 trees; Penn-Mary Coal Company, 54,000; Colonial Collieries Com-

pany, 37,100; Westmoreland Coal Company, 19,000, and Cresson Refractories Company, 11,500.

Private individuals and corporations are not indulging in the practice of forest tree planting as a pastime, but are conscientiously attempting to make their idle acres attractive and productive, and stand ready to use the best forestry methods available in order to attain their goal. The Pennsylvania Department of Forestry surely acted aright when it inaugurated the co-operative scheme of

private planting, and the results thus far attained show that the private planters have been given ample and good direction in their untried undertaking.

The measure of success attained in the enterprise can best be estimated by quoting from the planting reports and correspondence of the tree planters. One tree planter writes that, "Of the 3,000 white pine and Norway spruce trees set out in the spring of 1918 all but 17 are alive." This represents an establishment of 99.4 per cent, and it is not surprising that he states that "more ground will be cleared this summer for planting in 1920." Another planter reports that "the 1,400 trees shipped to me were received in good condition, and planted personally by me. I handled each one myself and I am so proud of the result,



MEASURING THE HEIGHT GROWTH OF A PLANTATION OF 34,000 SCOTCH PINE TREES
The trees are eight years old and average 74 inches in height. One tree grew 52 inches in one season.



A STAND OF PLANTED WHITE PINE

The kind of timber white pine gives when planted carefully and treated properly.

that I would rather plant trees than eat." Another applicant reports that, "I have been planting from 1,000 to 1,200 trees each year, and they are doing well. I expect to continue planting until the present tract of 25 acres is full of trees, and then begin on other lands." This applicant has a real constructive planting plan based upon some of the best principles of scientific forestry. It incorporates the fundamentals of sustained yield, and there will be developed ultimately a normal gradation of age classes, which some think exists only in continental Europe. The most satisfying and promising report was received from a life long lumberman who wrote as follows: "Enclosed please find an application for 20,000 forest tree seedlings to be planted in Towanda township, Bradford County, Pennsylvania. The land which I desire to reforest is rapidly growing up to a great variety of woods, but there are open places where the timber growth is insufficient and the creation of a new forest can be assisted by planting. The land will never be lumbered again as long as it remains in the hands of the present owner. The writer has been a life long lumberman and has removed the lumber from a great many thousand acres of land in three different states, and now desires to aid in the development of forest growth and not in 'its destruction'."

The foregoing quotations from practical tree planters should not only support but strengthen our faith in forest tree planting. The accomplishments of the past are small compared with the possibilities of the future. There are many owners of woodland within the state who are able and willing to plant forest trees on their holdings, if they are informed concerning the attractive co-operative scheme of the Department of Forestry.

The cost of the trees to the applicant is exceedingly low. The following orders shipped during the spring of 1919 may serve as examples of the range of cost. An applicant received 5,000 white pine (2 years old) and 5,000 Norway spruce (2 years old). The total cost of

this shipment at the planting site was \$7.00, distributed as follows:

Packing and hauling.....	\$3.25
Express charge	2.75
Drayage to planting site.....	1.00

Total \$7.00

Another applicant received 500 white pine (3 years old) and 500 Norway spruce (3 years old) at a total cost of 63 cents of which 35 cents were for packing and hauling and 28 cents for postage. A third applicant received 1,000 white pine (4 years old) and 1,000 red pine (3 years old) at a total cost of \$1.31, of which 65 cents were for packing and hauling and 66 cents for postage.

The conditions upon which the trees are distributed are very simple and reasonable. The applicant agrees:

1. To pay the cost of boxing, hauling, and transportation as soon as the seedlings are received.

2. To plant the trees in Pennsylvania for reforestation.

3. That the trees shall not be offered for sale, or sold.

4. That the trees shall be planted in accordance with instructions furnished by the Department of Forestry.

5. To furnish a report on the planting when requested.

6. That the planted area will be protected from trespass, fire, and grazing, so far as lies in his power.

7. That the subsequent treatment of the plantation will be in accordance with the principles of scientific forestry, information as to which will be furnished by the Department of Forestry on application, without charge.

The foregoing conditions show clearly that the real goal of the effort is not the placement of a large number of orders and the resultant distribution of millions of small trees, but rather the successful establishment of many promising stands of trees all over the state which will be developed to maturity in accordance with the principles of scientific forestry.



A FOREST TREE NURSERY AT CLEARFIELD, PENNSYLVANIA

It produces over one million seedlings and transplants annually. The trees are removed from the nursery at the age of two to five years.

OFFICES OF MARYLAND STATE BOARD OF FORESTRY DESTROYED BY FIRE.

The offices of the Maryland State Board of Forestry in McCoy Hall, Johns Hopkins University, Baltimore, were destroyed by fire on November 27. With the exception of some publications and exhibit material, which was kept in another building, everything was destroyed, including valuable records representing several years of field study and investigation, a report in manuscript form, 700 lantern slides, some 1500 photographic negatives, about 3000 photographs, a forest library of some 200 volumes, together with a nearly complete set of state publications on Forestry, and publications of the Federal Forest Service.

One of the most serious losses was that of the files containing the mailing lists and official records, which cover a period of thirteen years of State Forestry work. In some respects it is necessary to begin the work over again, although the published reports contain a record of fair accomplishment.

Since the mailing list will have to be entirely remade, it is important that those who wish to secure future publications of the Maryland State Board of Forestry, should make application to be entered on the new mailing list.

NOW FOR FOREST FIRE CONTROL

BY ALFRED GASKILL, STATE FORESTER, NEW JERSEY

IT IS time to face squarely the situation in which the country is placed with respect to forest fires, and the part that they play in the effort to satisfy the Nation's future need for lumber. The thoughtful public is more or less familiar with the havoc that is wrought by forest fires—the human lives, the towns and villages, the standing timber, the growing forests that yearly are sacrificed; it knows little of the conditions which bring about this destruction. That part of the population which lives in and near the woodlands knows so much that it is indifferent and callous. It often looks upon the fires as

that in some sections droughts must be counted upon at certain seasons; that careless hunters, thoughtless smokers, and often the farmers clearing their land, are weighty factors in the problem.

If the Federal Forest Service announces, as it recently announced, that a million dollars have been spent the past season in fighting fires on the national forests, the public accepts this fact and inquires no further. The statement that in one of the states a billion feet of timber has been destroyed is apt to be interpreted in the light of an understanding that there is plenty left. If one of



A BURNED FOREST

This photograph represents public wastefulness. The forest is unattractive and produces no lumber.

inevitable and as not always undesirable. It starts fires thoughtlessly and does little to control them. A season of comparative immunity from serious fires serves to lull the public, the press, the legislatures, and even the interests most concerned, into fancied security. The lessons of the past are forgotten until the next great fire comes.

When the situation is more carefully considered it is apt to be dismissed with an assertion that the railroads are responsible, or that the season was exceptionally dry, or that electric storms set the woods afire; in short that forest fires are inevitable. Though it is a fact that all these agencies are potent, it still is tremendously true that the railroad fires are only a part of those that start;

the smaller states encounters and subdues several hundred fires in a season, the actual menace and the loss escaped are little considered.

It is imperative that we recognize the seriousness of our position and take measures in every state to overcome the influences, whatever they be, which are causing the destruction of the timber supply upon which the next generation must depend. More than that, our present policy tends deliberately to foster the wasteful habits in which the people of America have been brought up. The sight upon every hand of vast areas given over to waste through fire is demoralizing. In many sections the demoralization goes so far that the value of agricultural

land, even of villages and towns, is depreciated. In more ways than in respect to lumber are we preparing to prove the adage, "Wilful waste makes wilful want."

In a region in which droughts provide conditions under which the forest is easily burned, or in which lightning fires may be set, it is almost self-evident that the utmost vigilance in the way of patrols, tower observers and organized crews of fire-fighters should be provided. In sections where the railroads are largely responsible regulatory measures are demanded: the railroads themselves are usually as much interested as the public.

The United States is facing a timber shortage, not because it is cutting its forests so rapidly, nor even be-

problem which involves nothing less than a complete change in the habits of a whole people, and their education to a realization of the facts of the situation. If the nation is now spending one million, or two million, or five million dollars to control forest fires, and suffering a loss of mature timber valued at five or ten times as much, with a loss in young trees that is quite indeterminable, is it not the part of wisdom to devote a portion of the annual outlay, plus a fraction of the annual loss, to a service that aims at the *prevention of all fires*, the elimination of direct loss, and the preservation of the growing forests upon which the future is dependent? Forestry will not be established in America by planting a few thou-



AN UNBURNED FOREST

This makes the most of soil and climatic advantages, is attractive and yields wealth in the form of lumber.

cause they are cut recklessly, though that is true, but principally because forest fires the country over are checking nature's effort to produce other forests for the benefit of later generations. No policy of forest extension, or forest control, can hope for success which is not founded upon a forest fire service capable of guaranteeing a negotiable interest in every growing forest. Silviculture is impracticable where the fire hazard is considerable; no logger can be expected to save his smaller trees for a future cut unless he can have an assurance that they will be preserved; forest planting is a foolish waste unless the plantation is made where the danger of burning is small.

Foresters are agreed that this problem is fundamental and vital. They realize, too, that fire control is more than a matter of law—even of enforced law. It is a

sand, or even many million, trees; it will come, in the main, through the protection, improvement and wise management of the forest areas, already stocked, which are our heritage.

No one appreciates the magnitude of the task more than those who have engaged actively in forest fire control; yet no one is more confident than they that the problem is essentially one of organization, supported by only reasonable amounts of public funds.

I appeal to the foresters and forestry interests throughout the country to take up, and press, an active campaign for forest fire control, in Congress and before every state legislature that meets during the coming winter. Details need not be discussed here. They can safely be left to the men who are entrusted with the work on behalf of the various states.

A NATIONAL FOREST POLICY

AMERICAN FORESTRY MAGAZINE HEREWITH PUBLISHES SOME MORE MATTER OF INTEREST REGARDING THE NEED OF A NATIONAL FOREST POLICY AND THE KIND OF A FOREST POLICY PROPOSED BY UNITED STATES FORESTER HENRY S. GRAVES. COL. GRAVES' OUTLINE OF THE PRINCIPLES OF SUCH A POLICY WAS PRINTED IN THE AUGUST ISSUE OF THE MAGAZINE. FORESTERS, LUMBERMEN AND TIMBERLAND OWNERS THROUGHOUT THE COUNTRY HAVE BEEN INVITED BY THE AMERICAN FORESTRY ASSOCIATION TO EXPRESS THEIR VIEWS ON THIS VITALLY IMPORTANT SUBJECT.—EDITOR.

NATIONAL LUMBER MANUFACTURERS RESOLVE

A RESOLUTION passed by the special committee of the National Lumber Manufacturers' Association and referring to a National Forest Policy is as follows:

Referring especially to the suggestion for a national forest policy as represented today by Colonel H. S. Graves, Chief Forester of the United States, and in response to the request of the National Lumber Manufacturers' Association, we recognize that both national and industrial welfare demand early development of an American forest policy which shall substitute for indifference or accident, an intelligent, practical, equitable and concerted program for the perpetuation of forest supplies; and in behalf of the National Lumber Manufacturers' Association we offer the facilities of the lumber industry to the end that the determination of such program may be effective and consistent with the true interests of the public.

The committee also passed the following:

Recognizing that no general regulations can properly be imposed; that most forestry problems are largely local, we recommend that each constituent organization of the National appoint a committee to consider the valuable suggestions made by Colonel Graves, to confer with their local state and Federal forestry authorities as to what steps are needful and practicable in their respective localities, and to promote the adoption by public and industry of such steps as may be mutually agreed upon.

We further recommend the continuance of a standing committee representing the National; preferably one also representative of the local committee which should assist said association and Government in all related matters requiring general consideration.

A NATIONAL FOREST POLICY

THE committee on Forest Conservation of the American Paper and Pulp Association, after a careful consideration of the need of a national forest policy and its features has recently made a report embodying its suggestions for such a policy with special reference to the pulp and paper industry.

This report says in part:

Any program looking toward the solution of the problem of a permanent timber supply must be:

- (a) Adequate and practicable to produce the needed results.
- (b) Just to all interests concerned.
- (c) Acceptable to the majority.

We believe that to grow the bulk of the older and larger sizes of timber, public ownership of timberland—National or State—with private cutting and marketing operations is the most feasible solution of the problem. The production of large-size timber is too long an undertaking with too great hazards and too low a rate of return to attract private capital in adequate amount. The State and National Governments, whose primary concern is the welfare of all citizens and industries, can best afford to engage in the long time undertakings of timber growing at a low rate of return upon invested capital. On the other hand, the public will get much better service if the operations of transforming stumpage into merchantable commodities and their distribution are left to the energy, initiative and ingenuity of private capital under such silvicultural regulations as will best perpetuate the supply of raw material.

We believe that there is urgent need for the speedy adoption and execution of a forest policy by the National and State Governments in co-operation to accomplish these things:

FIRST: A forest survey and land classification to determine what we can have in the way of present supplies and the areas which may properly be designated as necessary for watershed protection and as affording opportunity for future timber supply.

Second: A great enlargement and extension to all appropriate parts of the country of the public purchase of cutover lands for which ample precedent has been established in the East, by both the Federal Government and by some of the states. National Forests in the West created by the setting aside of land from the public domain now contain some 135,000,000 acres. Much of this land, however, is but poorly forested and even under a much more extensive planting policy than has yet been proposed will not be a source of any considerable timber supply for a long time to come. The best interests of the country would seem ultimately to require at least twice the present area of public forests.

THIRD: A much more vigorous and general extension of Federal co-operation with the states in fire prevention along the line of the Weeks law coupled with such additional measures in the different states as will most reduce the fire hazard and afford opportunity for natural reproduction.

The states should do much more than they have yet done in the way of fire control. While the private owner may not be legally compelled to grow timber upon his land if he does not wish to do so he is under both moral and legal obligation to handle his property in such a way that it does not become a public men-

ace and the state may require him to conduct his cutting operations in such fashion as to lessen the fire danger.

FOURTH: The states through the adoption of uniformly fair forest taxation laws, the establishment of forest nurseries and the preparation of forest working plans should offer every possible encouragement to the owner who wishes to grow timber on his land. If the owner of land, which after competent examination is classified as valuable only for timber growing, still refuses to take advantage of the opportunities provided for such undertakings, the land should then be acquired by the public at a fair valuation and made a part of the system of public forests.

FIFTH: With a few notable exceptions forest planting has not yet been seriously undertaken in the United States. Very properly the most immediate concern is the protection of the timber we already have but with this, because of the time element involved, there should

be carried out, wherever sufficient fire protection can be secured, a very large program of forest planting upon the lands which have been so far denuded that there is no hope of securing another crop through natural reproduction.

Finally: While we regard all the foregoing as necessary steps in any adequate and well rounded out National forest policy, we especially urge that every effort be made to unite the professional foresters of the country, the timberland owners and the consumers of forest products upon an immediate program of greatly increased forest fire protection and much more general public acquisition of cutover lands. The first essential is to protect what we already have; the second to provide for future supply. Upon these measures the National and State Governments can and should cooperate to the fullest extent.

RESOLUTIONS FOR A NATIONAL FOREST POLICY

ADOPTING resolutions declaring for a comprehensive timber survey and land classification, for extensive reforestation of State and private areas, adequate fire protection, and a system of taxation which will encourage the owner of trees to let them grow instead of forcing him to cut his growing timber, the Forestry Conference arranged by the New York State Forestry Association between Col. Henry S. Graves, Chief of the United States Forest Service, and New York interests involved in the timber problem did more to advance the cause of forestry than any **gathering ever** held in New York State. For the first time all elements in the State took action for definite forward progress on agreed necessities, and eliminated from discussion all points on which there was not thorough agreement. The resolutions follow:—

This Conference of those interested in the forests and timberlands of the State of New York and of the Nation, grateful to Divine Providence for the gracious calm which has succeeded the turmoil and destruction of the conflict ended on the day of which this the first anniversary, registers the following statement of principles as the result of its deliberations, and commends them to the consideration of the people of the State and the Nation, viz:—

1. Timber Census. Whereas, the Great War just ended has shown clearly how inadequate is our knowledge of existing timber resources, and

Whereas, pending the securing of such definite knowledge any attempt to formulate a permanent timberland policy must necessarily be premature and without adequate basis.

Therefore, resolved, that this Conference favors a comprehensive timber survey and land classification under the authority of the Federal Congress and of the Legislatures of the different states.

2. Fire Protection. Whereas, the fundamental step in any timberland policy which may be adopted as a result of the aforesaid timber survey and land classification,

is increased protection to our forests from fire, insects, fungi, and other ravages, but more particularly from fire,

Therefore, resolved, that this Conference strongly endorses the policy of complete and adequate fire protection embodied in the laws of the State of New York, and urges its extension to all the forest lands of the State, at the same time commending its adoption to the Federal Government and the governments of the sister States of our Union, and we further especially urge that adequate appropriations be made for the enforcement of the Weeks Law, both as to forest protection and forest land acquisition.

3. Forest Taxation. Whereas, taxes on standing, growing timber should be collected when the timber is harvested, and not annually, as now under the general property tax, and

Whereas, this deferring of taxes would go far towards enabling the land owners to carry their forests until maturity without cutting,

Therefore, resolved, that this Conference approves the co-operative efforts of the New York State Forestry Association in this respect and urges its representatives to continue their labors of the past two years until the desired legislation is secured.

4. Reforestation. Whereas, the reforesting of non-agricultural lands, now unproductive, is most desirable, and

Whereas, the owners of such lands would be willing to dedicate them to continuous forest production, provided such a crop promised a profit at maturity, which is seldom the case to-day, and

Whereas, the State benefits through the favorable influence of such forests upon climate, and run off, through the production of timber and through other advantages ancillary thereto, which would amply repay the public for any benefits extended to the owners,

Therefore, resolved that this Conference urges the Legislature of the State to assist by such action as will

encourage private owners towards the reclamation of their waste lands, and

Furthermore, resolved, that this Conference recommends greatly increased reforestation by the State of its idle acres, both those now owned and hereafter acquired by it, and

Finally, this Conference desires to express and does hereby express its appreciation of the work of Henry S. Graves, Chief Forester of the United States Forest Service, in the promotion of forest conservation and tenders him its sincere thanks for his attendance at and his aid in the Conference.

WHY NOT A SECRETARY OF FORESTRY?

BY F. W. RANE

THE time is ripe for creating a new cabinet officer, a secretary of forestry and conservation. As long as so important and fundamental a field of world-wide economics is subordinated to other avenues, like those of Agriculture and Interior, which in themselves are almost boundless in their activities and importance,—just so long will this important field of forestry and conservation play second fiddle, and never be able to stand on its own feet and accomplish what it should.

We must conserve what natural resources we shall have and secure greater leadership in enacting fundamental laws and principles of actual practice and cooperation on the part of the national government, states, and individuals, if we are to accomplish results.

Nothing short of a clear-cut and recognized leadership on the part of our American public which could be symbolized in a President's cabinet-officer can fill the bill.

My idea would be to have it fully understood, that control and direction of natural resources would be directly under the supervision of this new cabinet official.

Forestry and conservation have had their sporadic leadership at times in such presidents as Harrison and Cleveland, when our National Forests were created, and then by Roosevelt, who greatly enlarged upon the national program, and was the father of a new forest policy and conservation.

Our natural resources are certainly worthy of the greatest leadership and recognition in their care and economic utilization that we as a people can bestow upon them.

The creation, therefore, of the cabinet office of forestry and conservation, which logically comes with it, the interests and functioning of this work throughout the nation, will in my judgment mean more in our real economic development than anything we can do. The machinery and organization, to our credit, is well under way, but it needs, like many of the European countries, a seaport of its own, in order that its real development may be unhampered. It is unnecessary to point out at this time the important part that lumber and the by-products of the forest played in winning the war, and the experience should be enough to at least give wholesome recognition of its importance.

The Government now owns one-fifth of the standing timber of the nation. The expenditures of the Forest Service alone have increased from less than thirty thousand dollars in 1897 to approximately ten million dollars in 1918. The receipts, likewise, have increased from the National Forests' sales from nothing to millions during the same time. There are, likewise, many assets, such as recreation and out-of-door health-giving qualities that we are yearly growing to appreciate, which leadership will bring to light. We need a more modern forest policy. Colonel H. S. Graves, the United States Forester, is working hard and well to establish one, and so are President Charles Lathrop Pack, of the American Forestry Association, state foresters, and progressive lumbermen everywhere. Therefore, why not give the whole question the impetus that it deserves by having forestry and conservation under the direction of a government department devoted solely to this work.

What is true of forestry is equally true of conserving all our natural resources. The longer we allow our natural resources to be developed in a haphazard manner and without the very best direction and control, we are just to that extent wasting our nation's birthright, regardless of any argument to the contrary. There was never a time in the history of the world when the future of every country depended more upon the intelligent and economic development of her every natural resource than the present.

Are we going to rise to the position of a world-power, and then find as in the parable, we have built our house upon the sand instead of upon a rock. These are no idle words and this is no time to allow so important a matter to go by unheeded. There are great and powerful financial interests already developed and their usefulness and importance are of the greatest of benefit, but it inevitably follows that sooner or later there is a great need on the part of the government and the corporations, or these interests, of an understanding, in order that all may work out for the best.

The reconstructive period is here, and we can ill afford to continue wasting our birthright. Lumbermen, manufacturers, power companies, sportsmen, naturalists, statesmen, and all public-spirited, country-loving citizens, should subscribe joyously and heartily to this idea.

SLASH PINE GROWTH IN THE SOUTH

BY WILBUR R. MATTOON

EXTENSION SPECIALIST IN FORESTRY, U. S. FOREST SERVICE

MUCH has been said about the vast area of cut-over timberland in the South, its idle condition, and its potential value for farm crops, livestock, and timber. Passing over the big problem of fire protection, which should not be an insurmountable obstacle to good management with the right sort of encouragement to private owners from the Federal and State Governments, the factors that make the Southern pine belt economically attractive for investments in young or growing forests are (1) an abundance of land of low value in excess of all that can possibly be used for farming and stock raising

and South Atlantic coastal region and passing northward to Missouri, Kentucky and Virginia.

Slash pine (*Pinus caribea*), formerly called by the U. S. Forest Service "cuban" pine, occurs over the central plains from South Carolina to the Mississippi River. It is very closely associated with longleaf pine, from which it is not easily distinguished. Its home is in the poorly drained flat lands and sour soils, and in this respect it is the complimentary species of longleaf pine, which occupies the dry, sandy "ridges." These ridges, alternating in somewhat regular fashion with the flat lands,



LOGGING MATURE SLASH PINE IN THE FLAT WOODS

On account of the close similarity in the foliage, bark, and wood, mature slash and longleaf pines are not commonly distinguished and are cut and marketed as longleaf pine. The effect of repeated forest fires is seen in the damage and killing of many trees.

during the next 30 to 50 years—the life or rotation of a second-growth forest crop; (2) a very long growing season; (3) good logging and shipping facilities, and (4) relative nearness to the big eastern markets.

Four species of pines must comprise the chief agents of economic production during the next half century on a vast area of low-valued, southern cut-over land, an area consisting of the "excess" lands that cannot possibly be utilized for other crops or for livestock development. The "big four" pines are: Slash, longleaf, loblolly and shortleaf pines, mentioned in the order of their geographical predominance beginning at the extreme Gulf

make up the extensive, slightly undulating coastal plain.

In its younger stages slash pine has very generally been mistaken for loblolly pine, which it resembles in growth even more than it resembles longleaf pine in its more mature stages. This fact affords the chief explanation for the lack of general acquaintance with and general recognition of slash pine.

With the cutting of the virgin forest in this region, slash pine seems to have acquired a much larger local distribution, in much the same way as in the case of loblolly pine farther north.

Slash pine is the predominating species in the young

forest growth over considerable areas formerly occupied by longleaf pine. The region extends from southern South Carolina over the lower third of Georgia, through extreme southern Alabama and Mississippi, southeast Louisiana, and extensively over Florida. Although chiefly poorly drained, sandy flatlands, the region extends into the rolling hills of southern Georgia for a



A THREE-YEAR OLD SLASH PINE SAPLING

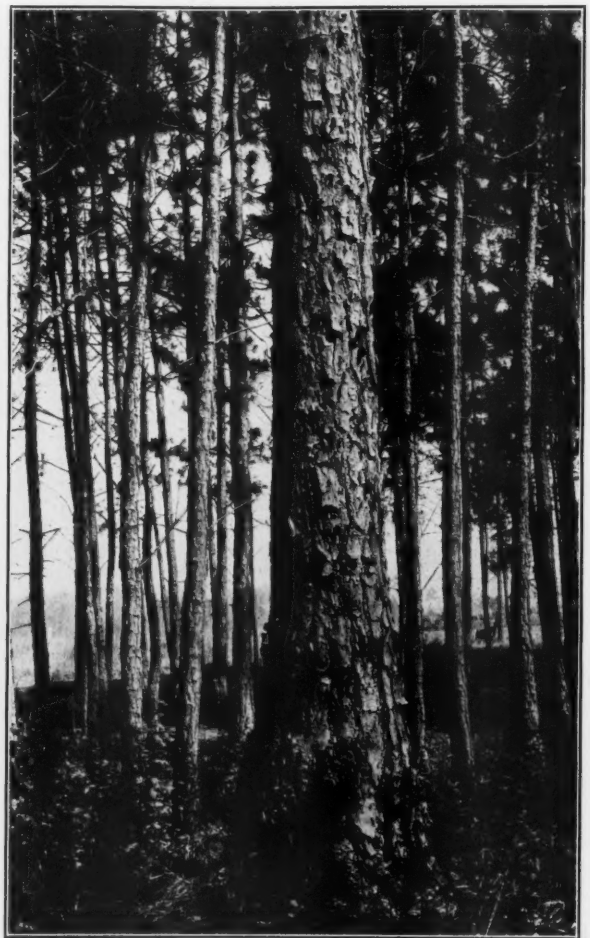
This made a height growth this year of about 32 inches. Longleaf pine at this age would be from 2 to 4 inches in height. Unlike longleaf, slash pine does not have a heavy tap-root and is easily and successfully transplanted.

distance of 125 miles from salt water. Localities of high, relatively dry hill land, especially a portion of Florida about Tallahassee and the Florida National Forest, form well marked exceptions in the general spread of slash pine. Because of the uneven distribution of seed trees and the occurrence of annual fires, the stand of young slash pine is by no means regular or continuous.

Recent growth studies of slash and longleaf pine, although inadequate in number, point clearly to a marked difference and superiority in favor of slash pine. For example, slash shoots up rapidly in height during the first 25 years as compared with longleaf; at 30 to 35 years on poor situations, its upward growth appears to average about the same as that of longleaf on favorable situa-

tions. Longleaf, however, seems to be more persistent in height growth and somewhere at about 50 to 60 years of age bids fair to outstrip its rival. The average height growth up to middle life is shown by the studies thus far completed to exceed noticeably that of loblolly pine in the coastal region of the Middle Atlantic States.

The structure of the wood, shown in cross section herewith, is such as to give it very high commercial value. Even when young and fast growing, the tree produces a proportionately wide band of summer wood, very dense and resinous, and sharply demarcated from the spring wood of the same season's growth. The disk here shown—the breast high section of a 17-year old tree, 10.7 inches in diameter, is composed of 63 per cent of summer wood, a striking amount for a tree of such rapid growth.



A LOUISIANA FAMILY

A slash pine mother and her children. The 18-year old stand might now be tapped for turpentine, but to let the trees grow for a few years will be good economy for the owner.

Fast-growing loblolly, in comparison, has much narrower summer wood, grading very gradually into the wider band of spring wood.

Young stands should be operated under methods which conserve their productive capacity for crude turpentine, such for example as those used by the French. In this manner they can be profitably worked from the time they

reach the age of 15 to 20 years during a period of 30 to 35 years or more. Under such management the density would be regulated for the development of medium sized trees with thrifty crowns, and necessary thinnings would be brought about by means of heavy and profitable cupping before cutting the timber product. This advantage can hardly be over-emphasized in consid-



SLASH PINE THREE AND TWELVE YEARS OLD

An abandoned field with vigorous growth of slash pine 3 years old (on the right), now 4 to 6 feet high. In an earlier 12-year old stand to the left, the trees although over-crowded, are 3 to 5 inches in diameter at breast height and 30 to 40 feet in height. Slash pine begins bearing seed at about 12 years.

ering the profitability of growing slash pine under forest management.

Sufficient measurements of growth are not available at present to forecast very broadly the financial returns on investments in land devoted to second growth slash pine stands. It can be said roughly, however, that well stocked slash pine stands 15 to 25 years old should yield a return in turpentine of \$1



A TURPENTINE OPERATION

A 13-year old slash pine stand being worked for turpentine. The X's point to "faces" the old time wasteful and ruinous "boxing" method being used. One hundred trees per acre are being turpented, bringing the owner \$10.00 per acre, and leaving 528 trees per acre for later working.

an acre for each year of its growth, and, at current stumpage prices for pulpwood in North Carolina and Louisiana, \$1 to \$1.50 per year in pulpwood, or a total of \$2 to \$2.50 yearly during the life of the stand.

A calculation by the Forest Service of the number of cords of pulpwood yielded by well stocked stands of slash pines of different ages gives a yearly production of about one cord of peeled wood per acre from stands roughly 10 to 16 years old, and 1½ cords per acre from stands over this age up to 25 years. These are natural stands subject to annual burning and the slowing up in growth due to direct injury to the trees and loss of organic matter or humus from the soil. Under forest management this growth should be materially increased. Part of the story of growth will be found by the reader in connection with the several accompanying photographs.

In the course of the economic development in progress over the South, the South Atlantic and Gulf States have

a splendid opportunity to utilize profitably their hundreds of thousands of acres of sandy, "barren" lands by handling them for turpentine and pine timber products from second growth slash pine stands.

Slash pine possesses some striking silvicultural and economic qualities. Its high production of crude turpentine is recognized among all operators. Mr. C. F. Speh, Secretary of the Turpentine and Rosin Producers Association of New Orleans, is authority for the statement that slash pine not only produces larger quantities of crude turpentine, but also a whiter and higher grade of rosin than does longleaf pine. By official tests of the Forest Products Laboratory of the U. S. Forest Service the wood ranks as the heaviest, hardest and strongest wood of any coniferous species in the United States. The tree seeds rather freely, bearing a small, light, winged seed easily carried by the wind, is readily and successfully handled in the nursery and in forest planting, and its growth is vigorous and rapid.

TRACTS ADDED TO FORESTS

PURCHASES totaling 66,381 acres in the White Mountains, the southern Appalachians and Arkansas at an average price of \$3.91 per acre have just been approved by the National Forest Reservation Commission, a body created by Congress to purchase land on the headwaters of navigable streams for the protection of their watersheds. The action of the commission means that usefulness of the new National Forests in the East, the inception of which dates from the beginning of purchase work in 1911, will be greatly increased.

Of the above total 362,288 acres are in the White Mountains, constituting about one-half of the mountain lands which it is desirable to acquire in the White Mountains of New Hampshire and adjoining portions of Maine for the protection of the headwaters of important streams. The purchase which has been authorized in the White Mountains consists of 1,650 acres of timbered land in Oxford County, Maine, at an average price of \$9 an acre.

In the Monongahela area, Tucker County, West Virginia, 23,900 acres of cut-over land were approved for purchase at an average price of \$2.34 an acre; also the purchase of 489 acres in Hardy County, West Virginia, on the Potomac area, at an average price of \$4.34 an acre.

In Virginia a total of 14 tracts, comprising 10,630 acres, were approved for purchase, the average price being \$3.87 an acre. Of this land 8,705 acres are in Rockbridge County, 1,190 acres in Amherst County, 214 acres in Highland County and 521 acres in Augusta County.

In North Carolina, 4,416 acres in 17 tracts were approved for purchase. These are in Buncombe, Burke, Macon, McDowell and Caldwell counties, at the average price of \$8.73 per acre. The largest tract, that in Burke County, comprises 1,800 acres.

In Georgia, 52,828 acres were approved for purchase at an average price of \$6.60 an acre. This land lies in Habersham, Fannin, Union and Rabun counties, the largest tract being 4,833 acres in Union County. All of the authorized purchases are so situated as to fit in with other tracts already acquired or being acquired, the purpose being to make the publicly owned areas continuous tracts with as few privately owned intervening tracts as possible.

In Tennessee in the Cherokee area, 2,150 acres were approved for purchase in Monroe County, at a price of \$3 an acre.

In the Alabama area there were approved for purchase in Lawrence and Winston Counties, 5,950 acres, the average price an acre being \$5.04.

The approvals for purchase of land in Arkansas were made with a view to further "solidification" in the Arkansas and Ozark forests—that is, the acquiring of scattered alienated lands in the midst of tracts previously acquired. The total amounts to 9,323 acres at an average price of \$3.98 an acre. The tracts are located in Stone, Newton, Pope, Montgomery, Scott, Yell, Perry, Polk and Logan Counties, the largest tracts consisting of 920 acres in Perry County and 800 acres in Stone County of cut-over land.

PLANT MEMORIAL TREES FOR OUR HEROIC DEAD

THE DRY KILN AND CONSERVATION

BY E. W. TREEN, B. S. F.

DURING these days when conservation of our natural resources, particularly our forest resources, is preached right and left, it seems to the writer that not enough stress is put on the subject of conservation for the benefit of the present generation. This is not inferred as a detriment to our future generations, but as a direct aid to production for their benefit in the future.

Forest conservation seems to be mainly dependent, according to the writer's point of view, on three things, namely, reforestation; protection from external agencies, as fire, ruthless lumbering, etc., and closer utilization of our present cut. This article deals with a phase of the last of the three, a phase which is not very familiar to the public at large, the dry kiln as a phase of utilization.

The dry kiln is the only practical means we have at present of drying lumber fast enough to insure the wood-working industries a profit in the shortest possible time after the raw material is obtained. Kiln-drying is really the first step toward the finished product after the rough lumber stage is passed. The condition of the kiln output is in direct proportion to the good or bad condition of the finished product. By this is meant that if badly dried lumber starts through the processes of manufacture, all results of these processes will be damaged to the same extent.

A mere mention of a few important industries dependent on kiln-dried lumber will bear out the magnitude of the subject. First of all, is the manufacture of furniture, in which the United States holds a very high place in the world's market. Then we may mention the manufacture of flooring, auto bodies, toy production, and several other related industries. To provide for the wants of these industries, several standard dry kilns are on the market, most of which will give good results if properly handled. The Forest Products Laboratory at Madison, Wisconsin, is doing yeoman service in experimental work in the dry kiln line, but the results of these investigations do not reach nearly as many of our people as they should.

The basic principles of successful dry kiln operation have been mentioned time and again, namely, control of circulation, humidity, and temperature. It is not the writer's idea to discuss these principles again, but to mention a few different phases, which he has seen in his travels as a dry kiln engineer, trying to show that these cardinal points are more often discussed than applied.

First and foremost is the man who operates the dry kiln, the dry kiln engineer, for, if he understands his business he is an engineer in the highest sense of the word. When the Forest Service employs highly technical men in dry kiln investigation, and practically all our forestry colleges are giving courses in dry kiln engineering, it is a pretty good indication that there is more to the game than simply turning steam into a brick building, and leaving the lumber therein to work out its own salvation. As a profession dry kiln engineering offers more

opportunity for successful research, in the writer's estimation, than most of the engineering professions. Here are the prime requisites of the successful dry kiln engineer: He must know wood in all its phases, as to species, wood structure, working qualities, sensitiveness to outside agencies, as heat, moisture, etc.; he must have a thorough knowledge of thermo-dynamics, and a knowledge of how the different species are affected by the different heat agencies.

To assume we have the man suitable for the job, here is one reason why this man is not getting the success he should be getting. It is the interference of those higher up in the business. As an example may be stated the case of the dry kiln engineer at many of our large furniture factories here in Michigan. The superintendent complains to him that 6/4 red gum on being worked, shows a deal of warping and signs of checking. This gum contained thirty per cent of moisture when placed in the kiln, and the operator knows that it will take at least fifteen days to dry it effectively. But the shop foreman wants it rushed through in ten. The operator does as he is told, although he knows what the result will be, and he is blamed when the results are seen. To insure success, the operator must be absolute master of his kilns, and, within reason, should be troubled by no outside interference. If many employers would think of this a little more, many "unexplainable" dry kiln defects might be remedied. We realize that the superintendent wants his product on the market as quickly as possible, which is very easy to understand, but the effective working of the parts will insure the success of the whole.

Too often, also, a man is picked from the working force of the factory, to operate the dry kilns, a man who knows part of the process, but does not know, or does not care to know, other essential parts. The engineer is often picked to have charge of the dry kiln operation. Oh, yes, he understands his boiler capacity in fine shape, can furnish all the steam and spray required, keep his valves and piping in first class shape, but does he know the wood he is drying? Too often, no! As long as the temperature doesn't run too high, he thinks there is no cause for worry, and all the time the lumber is shrinking, warping and checking, until it comes out looking as if a tornado had been through it. This state of affairs can be remedied. If the employer doesn't want to pay the salary required by a first class operator, at least he can select a man who is interested in his job, and is willing to learn. Results have shown this is a surely wise policy.

The testing of the lumber is also too often neglected. From the writer's experience he has found that the general practice is to test the lumber for moisture content and shrinkage *after* it is supposed to be dry. At least four tests should be made to insure a perfect drying schedule, *i. e.*, just before the charge is placed in the kiln, after the steaming period, at least once during the

real drying period, and just before the kiln is to be emptied. The reasons for these tests are obvious. The first test gives an idea as to how long the lumber should be dried, the second and third tests as to whether the moisture is leaving the lumber, and the last shows whether the wood is dry enough for the intended purpose. The first test is also a safeguard to the purchaser in case he is buying kiln-dried lumber, specified to be down to a certain moisture content. If these tests are correctly made, a schedule can be built up from them, to be applied in drying future charges. Valves should be marked and steam pressure regulated, to insure as nearly perfect a schedule as possible with each charge. Schedules are issued by dry kiln manufacturers, but no two kilns will give the same results under such a prescribed schedule, due to changeable external conditions. The process of manufacture can usually be so planned to work in harmony with the proper kiln schedule. A hit-or-miss schedule is a sure indication of laxity in the operation. If records are kept of each charge and results obtained, a degree of perfection can soon be certified.

This has been a rather general discussion, but the writer has tried to give a few suggestions in kiln-drying lumber, so that less of it may go eventually to the burner, which means that less lumber will have to be used to complete the product for the market. This factor of less waste and more production will work backwards until our remaining standing timber is reached, until we come as near as we can to that goal, at which all good foresters are aiming, the saving of our timberlands.

"GUARDING FORESTS NEAR BROADWAY"

THAT there is an opportunity for forest fires within fifty-two miles of Broadway so astonishes the Editor of the Evening Sun, of New York City, that he proceeds to print a good story about the forests in the hope, no doubt, that his readers will be astonished too. The Editor of the American Forestry Magazine extends congratulations to the Editor of the Evening Sun and hopes he will find further opportunity to enlighten his readers by printing more about the condition of the forests in New York State and elsewhere. The article in the Evening Sun follows in part:

"Forests primeval, extensive wilderness resembling in every detail the enormous plains of the West—and only fifty-two miles from Broadway:

"Manhattanites who eke out their existence exploring the limits of Greater New York as far as the subway lines will permit them have never realized what a wealth of woodland, of the regular wild kind, is close to New York. There are no less than 400,000 acres of woodland, in Suffolk County, Long Island alone. So extensive are the wilds in that region that forest fires have occurred with dangerous frequency and means to combat them have been undertaken by the State conservation authorities.

"The occurrence of forest fires within such a short distance from Broadway may be a surprise to the average New Yorker, but a greater surprise is in store

for the city visitor to those regions, for he will have an opportunity to view for the first time the extensive fire protection system that has been installed there.

"The first thing that strikes the eye of the city visitor as he leaves the train at Holtsville, Long Island, is a huge forest observation station. It is located on Telescope Hill, which lies just north of Holtsville station on the main line of the Long Island Railroad.

"An expert observer, A. H. Lucas, of Selden, appointed to keep a careful watch of the surrounding woodlands during the forest fire season and to report them upon detection to the town supervisor of fire wardens, is stationed on the tower.

"The second tower is located on Flanders Hill, southwest of the town of Flanders and about seven or eight miles south of Riverhead. It is similar in construction to the Telescope Hill structure. From there one can command a view of the entire territory from the sound to the ocean. J. M. Brewster, a hardy, experienced forester, is in charge of this tower.

"The system of fire prevention on Long Island has been maintained by the Commission in the Adirondacks for many years, and its effectiveness in prompt detection of fires there has been demonstrated many times. When the Commission proposed sites for the towers last year, Long Island fish and game clubs as well as land owners subscribed liberally to provide funds for the purchase of the towers.

"Long Island is New York's playground," says William G. Howard, assistant superintendent of State Forests, who recently submitted a report of the condition of that territory to the State Conservation Commission.

"It is impossible to estimate the thousands upon thousands who go there for recreation and who have their summer homes there," Mr. Howard pointed out. "The central and eastern portions of the island are so far from the city that they are not densely populated. There are extensive areas of wild land grown up to brush and trees—unfortunately more of the former than the latter.

KEEPING THE BARK ON

FOR preventing the bark from flaking off logs used in rustic structures, the Forest Products Laboratory, Madison, recommends the following methods of seasoning and preparing the timbers as the most effectual:

(1) Cut timbers late in summer and score on two sides; that is, cut off narrow strips of bark for the entire length. Pile in shade in open pile to allow thorough circulation of air. Allow timbers to season until following spring or summer before using.

(2) Proceed as in (1), and in addition coat ends, stripped portions, and knots with coal-tar creosote, using one coat a few days after timber is cut and another just before using the timbers.

(3) Proceed as in (1), but do not score bark. When timbers are in place, tack bark on with large-headed nails, placing one to every square foot of surface. Paint heads of nails to resemble color of bark.

(4) Tack or nail the bark on without particular attention to time of cutting or other treatment.

STEADY "WAKE 'EM UP" BARRAGE

THE TRIBUNE CALLS FOR ACTION

UNDER the heading "Factories Peril Own Lives With Trees They Kill," the *Chicago Tribune* takes up the campaign of the American Forestry Association for a national forest policy. The *Tribune* bases its drive on a purely business argument and warns the industries of the Middle West in the following language:

"Approximately a fifth of the manufactories of Illinois, Indiana, and Ohio depend on wood for their running.

"In from ten to twenty years, at the present rate of unregulated cutting, unattended as it is by any systematic replanting, the lumber from the South will be exhausted.

"Then the Pacific Coast will be good for forty years, but it will be too expensive for the purposes of our factories to ship timber so far. Hence the factories will either succumb or be moved into the Pacific area. In either case we shall lose them.

"In these three states of Illinois, Indiana, and Ohio there is a great deal of soil that should not be farmed, if it is, because that soil is so poor that it does not pay the farmer a fair return for extraordinary severe effort.

"Some specialists estimate this unprofitable area at one-sixth of the total area of the three states. This estimate probably is excessive.

"On many of these farms people do manage to eke out an existence, but it is a growing economic waste to have generation after generation continue the struggle.

"But trees don't need so much humus as grains and grasses do. Trees are a mineral feeding proposition.

"You can grow good trees where you cannot grow good barley.

"Not dabbling in prophecy, but considering the foregoing facts, the state and county forests of Illinois, Indiana, and Ohio have formed, on the initiative of Ranson E. Kennicott, chief forester of the Cook County Forest Preserve, the Central States Forestry Association.

"The new organization hopes to hold its first meeting in Chicago next April.

"Its object is to formulate a tri-state forestry policy and urge upon the state governments the necessity of extreme measures of forestation and reforestation, and the

establishment of a system of restricted cutting that shall be in some proportion to the amount of replanting.

"The estimate of some members of the association, notably Mr. Kennicott, is that the three states could profitably put something like a seventh of their area into commercial forestry.

"The association bases its campaign on both the natural and the commercial advantages to be derived from a liberal policy of reforestation.

"First, the trees are needed to conserve moisture and prevent erosion, which is progressing in late years at an alarming rate.

"Second, the three commonwealths cannot retain their wood-using industries if they don't provide the wood for them.

"State authority and state aid in reforestation will be asked because private capital is not going to go into a proposition that looks as far forward as forty to sixty years for the richest part of the return. It's got to be the state.

"On the other hand, reasonably prompt returns are not excluded if the system of forest management be comprehensive.

"If you have absolutely to reforest bare land it will be about forty years before you can get a steady income from it.

"But from second growth and coppice areas, if treated scientifically, you can get a revenue in ten years.

"The first thing you get out, by a scientific treatment, is eight-inch ties. And if you treat a hickory forest right you get your revenue just as soon as you can cut ax handles. Five-inch hickory gives four ax handles.

"Here is an important point: There has been a kind of superstition among foresters that not more than \$10 an acre ought to be paid for forest land for commercial cutting, but that tradition is outdated now by the fact that the cost of most varieties of lumber has tripled in the last ten years.

"Only science and authority make prompt commercial cutting possible in reforested areas.

"Think, wood workers, what the newspapers are up against in the matter of wood pulp, and ponder your case."

LIKE the fabled Johnny Appleseed, who went from town to town, planting as he went, Charles Lathrop Pack, president of the American Forestry Association, is going up and down the country advocating the planting of trees, hammering day and night on the need of a national forestry policy. The demand for Memorial Avenues, Roads of Remembrance, Victory Boulevards, all planted with trees in honor of the men who

gave their lives for their country, is meeting with a remarkable response. Women's clubs, churches, rotary clubs, kiwanis clubs, patriotic societies and individuals are planting trees in rows, groups and groves.—*Pittsburgh Post*.

The American Forestry Association is urging the planting of memorial trees and creating "Roads of Remembrance," as a

simple and effective way of bringing the great principle of reforestation before the public mind and keeping it there. To interest the people in trees is the first step in the process of establishing such automatic recognition of the value and need of a national forest policy as shall be effective to save wide areas of country from climatic calamity, create great wealth in timberland, and avoid the present serious loss by

EDITORS FOR NATIONAL FOREST POLICY

fires. The foresters have hit upon an excellent idea: to plant trees as memorials of distinguished men has an appeal which is of genuine service to all the people as well as carrying a romantic tradition of enduring strength in the national character. Mr. Charles L. Pack, the president of the American Forestry Association, urges the planting of trees in all parts of the country as memorials to Theodore Roosevelt at this time of general commemoration of his birthday; recalling Roosevelt's strong interest in the subject, Mr. Pack says: "I do not believe the human mind can devise a more suitable memorial to Theodore Roosevelt than a movement which will look to preserving the forests of the country."

The foresters point out that the forests are like a bank account; they cannot be continually drawn upon without making some deposits. A national forest policy is a need which cannot be gainsaid; it is not a project for the benefit of the lumberman or the paper-maker or the wook-worker alone; it is in the interest of the whole population.—*New York Evening Sun.*

The American Forestry Association points out that the demands of France and Belgium may double the call for American lumber. Three and a half billion board feet of logs and lumber were exported annually before the war; seven billion may be needed now. In 1918 the fire loss was \$28,500,000, not much if one is thinking in billions, but a good deal from any other point of view. The acreage figures are more impressive: Eight billion four hundred million acres were burned over. The layman can do little to increase the stock of trees. But he can do a good deal, especially at this time of year, to save what we have. He can be careful with his camp fires, whether he thinks the ranger will catch him or not, can watch where his matches and cigarette stubs go, and can teach the gospel of fire caution to other people. The forests of

California are not ours alone; they belong to the nation.—*San Francisco Call.*

The coal miners' strike has brought vividly to the public comprehension how dependent the country is on the coal supply. Wood is the only practical substitute for coal, and wood can be produced in unlimited quantities. Forests have been for

pulp out of which print paper is made is consuming the growth of thousands of acres of forests annually.

Without regard to fuel, a wood famine would be almost as great a calamity as a coal famine, and it should be provided against.—*Nashville Banner.*

Great Britain has determined to spend \$17,000,000 in a ten-year campaign to replant as forest areas 250,000 acres of land to replace timber used during the war in France.

The United States could do no better than to follow the example of Great Britain and determine at once upon a broad plan for reforestation. Thus far the lumbering industry in this country has been one big problem in subtraction. If the nation does not begin to add and multiply before long, the only possible answer will be zero.—*Athens, Ohio, Messenger.*

It is gratifying to note that there is considerable interest in tree planting in Peoria at this time. No little of this interest is due to the campaign of the American Forestry Association which is attempting to get people to "plant a tree in America for every tree destroyed during the war." The forestry men are specially alert in their efforts to get trees planted along roads and public driveways—thus putting to practical use much land that has been bearing little except weeds in the decades gone by.—*Peoria, Illinois Journal.*

With thousands more interested in trees, thousands more will be interested in the ways and wherefore of a national forest policy.—*Minneapolis News.*

The president of the American Forestry Association of Washington has issued a call to the people to beautify their highways as memorials to the men who fought for world freedom. Good roads and tree planting go hand in hand.—*Elkins, West Virginia, Inter-Mountain.*

EVEN A COAL STRIKE MAY HAVE SOME BENEFICIAL EFFECT IF IT LASTS LONG ENOUGH



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This cartoon by Darling points forcibly to the value of a woodlot regardless of whether we have coal strikes or not.

centuries systematically conserved in Europe, and we must emulate and improve on the European example. And it is not because alone of the possibility of an exhausted coal supply that a production of wood is needed. There is an insatiate and increasing demand for lumber that can't be met after awhile if the forests are not replenished, and the demand for wood

STATE NEWS

CALIFORNIA

THE number of fires and the damage resulting in the area covered by the Weeks Law agreement in California during the 1919 fire season conclusively shows the necessity of increased co-operation under this law.

An appropriation, made by the California Legislature for fire protection work, became available July 22 and on July 25 four Weeks Law patrolmen were appointed by the State Forester and took up the task of preventing and combating fires. Approximately three million acres of the Sierra Nevada watersheds in Northern California were thus, for the first time, brought under protection.

The district assigned to each patrolman was large, too large in fact, to permit the effective patrol work that is necessary. The area placed under protection is one of great fire hazard due to climatic condition. At the same time its value as a watershed is immeasurable.

One hundred and sixteen fires occurred in the protected area during the eighty-two days of the fire season that remained after the appointment of the Weeks Law men.

Several of the fires, had they not been systematically fought, would have swept from the foothills into the National Forests.

Residents of the districts in which fires occurred expressed great satisfaction with the assistance given them to combat flames that threatened their property. Several landowners expressed a desire to aid financially the work of the fire patrolmen. In one county the Supervisors, wishing to do their share toward protecting property in the county, voted to pay bills for food required by fire fighters called by patrolmen.

Sentiment in favor of fire protection work was greatly increased in the counties in which Weeks Law men worked. While the men were kept busy much of the time with fire fighting they still found time in which to organize voluntary fire fighting companies, arrange for the placement of county equipment in districts of fire hazard and at all times they preached the gospel of fire prevention.

The fire season just closed has been one of the most serious on record in California, owing to a succession of dry seasons and the presence, during the fire season, of extremely high winds. It makes one shudder to think what would have been the result in the Sierra foothills during the recent summer months had there been no fire protection work. As it is the fire-blackened district is far too large and additional co-operation under the Weeks Law as well as increased appropriations by

the state are necessary if the ravages of fire in the foothills of the Sierras are to be stopped.

IDAHO

IN accord with almost unanimous sentiment in Idaho and in response to considerations vitally affecting adjoining National Forests, Congress has set apart 1,116,000 acres of land in Idaho known as the Thunder Mountain region, as National Forest lands. This great tract, difficult of access and having not over one per cent of its area suitable for agriculture, has for years been the scene of destructive fires and devastation due to overgrazing. It is now to be added to the Payette National Forest which adjoins it on the south and west, and the Idaho National Forest which adjoins it on the north and west. The area lies approximately 100 miles northeast of Boise. Because uncontrolled, it has been a recurring menace to the adjoining National Forests by reason of fires that have gained great headway in its vast unpatrolled regions.

IOWA

A REPRESENTATIVE of the Forest Service who recently visited Iowa calls attention to the fact that there is still a considerable area of timberlands in the State. The value of these lands has been only partially appreciated, according to the forester. Three-quarters of the Nation's timberland is privately owned, while but one-quarter is Government owned, and consequently it is in the privately owned forests, as well as the others, that conservation must be practiced. To avoid an increasingly serious timber shortage, it is essential that all of these lands be properly handled to produce timber and other forest products.

Because of the present high price of lumber the timber resources of Iowa have assumed an importance entirely unlooked for a few years ago. The representative of the Forest Service declared that there is a good opportunity for farmers of southeastern Iowa, particularly, to make use of their nonagricultural lands and the islands of the Mississippi by planting quick-growing trees, such as cottonwood. He also urged farmers to use small corners of their farms for this purpose.

MAINE

THE Legislature of 1919, by making an appropriation of \$5000.00 for the year 1919 and \$10,000.00 for the year 1920, for purchase of lands and general forestry purposes, made it possible for the State Forestry Department to start two new pro-

jects, namely, Forest Fire Protection and Slash Disposal in Organized Towns. Prior to this year, the organized towns with a forest area of about 4,500,000 acres never had any fire protection of any kind; while the unorganized towns (so called wild lands) are protected by a good sized appropriation and a good organization of Chief Wardens, Deputy Wardens, Watchmen, and Patrolmen. The present forest law makes the selection of each organized town Forest Fire Wardens of their respective towns, but does not provide for any funds either to protect the forests or fight fires. Without funds these Forest Fire Wardens are almost helpless. By the passage of the above named appropriation it gave the State Forestry Department a chance to start some forest protection in organized towns. Two steel lookout towers were erected, one on Agamenticus Mountain in the town of York and the other on Ossipee Mountain in the town of Waterboro, both in the County of York. These towers are located in the heart of the best white pine section of the State of Maine and are equipped with telephone communication with the Selectmen of the towns covered by these places, panoramic maps, binoculars, and range finders. The department contemplates establishing two more stations, one in the town of Denmark and the other in the town of Parsonsfield. The view from these two stations will reach the view from the nearest station in the Maine Forestry District which is located in the unorganized town of Grafton.

MONTANA

ONE billion feet of timber killed by 1445 fires is the estimate given for Montana's tremendous forest fire losses for the season just closed. Half of the fires were started by human agency and were preventable. The fires burned over 570,000 acres of land and were suppressed at a cost of \$1,200,000, according to figures compiled by the forestry office at Missoula.

A district logging engineer with headquarters at Missoula reports that he has seen cedar trees more than 2000 years old, still alive and growing in the Kaniksu forest which is in the extreme northeastern corner of Washington. "These trees," says the engineer, "varied in size from a foot to ten feet in diameter. I used a boring instrument on them and found that the trees were in all cases 2000 years old and some of them nearly 3000. The wood is firm and is a potential source of high grade timber. I know of no place in the United States, except the redwood forests, where trees of that age may be found."

NEW JERSEY

New Jersey has been extremely fortunate with regard to fire losses during the past summer and fall, in comparison with other sections of the country. The excessive rainfall has almost prevented fires from starting. From August 1st until the middle of November there have been less than ten fires in the entire state, and all of these have been trifling. For this period the total has usually been from 150 to 300. Last year during the four months there were 152 fires, while the year before there were 241.

The three year terms of most of the local firewardens within the state expire at the end of the year. The freedom from fires has enabled the staff to devote much of its energy to the reorganization and strengthening of this field force. The dead wood is being replaced by good timber, and special efforts are being made to insure that wardens who have displayed ability are reappointed.

The withdrawal of one of the division wardens from the Forest Fire Service to take up educational work brings about the first change in the staff of the state organization.

NEW YORK

THAT America can produce better forests than nature has given us, under right application of forestry was the declaration of Dr. Hugh P. Baker, Dean of the New York State College of Forestry at Syracuse before the American Paper and Pulp association in convention at New York, when the nation's paper makers asked him to discuss the report of their committee on forestry. He said: "The long growing Adirondack and other forests today not aided by man, may be growing at the rate of 200 board feet per year. The Black Forest, and other forest areas of Europe, not as well adapted to forest growth as very much of the forest area of this country, before the war were producing more than a thousand board feet per acre per year, and at the same time conserving water more effectively, were better places for fish and game, and were as effective as man can make a forest for recreational purposes.

"The difficult coal situation which has been before the public and our national government is educating the people in this country to the point where it is barely possible that the public may force the maintaining of productivity of forest lands as it looks as if the government may force the productivity from coal mines. It will be much better if the forest industries will solve these problems themselves by providing unity of action rather than to be forced into an awkward situation by what seems to be public welfare.

"New York probably leads the states of the union in the reforestation of forest lands. Great credit is due the State Con-

servation Commission for the aggressive way in which it has carried on reforestation. What they are doing, however, is but a drop in the bucket. What is the reforestation of three or four thousand acres when the State alone owns hundreds of thousand of acres which must be partially or wholly reforested before they can be put into profitable condition. The state should bond itself, if necessary, to protect and encourage the forest industries of the state as has been done for better highways and a great barge canal. There should be inducements held out to the owners of agricultural land to get better farm crops. Forestry is second in importance to agriculture as a fundamental to the life of a nation."

Uncle Sam has given formal recognition to the State Ranger School of the New York State College of Forestry at Syracuse, by sending to the school four of his wounded soldiers, and by preparing to send others from all parts of the United States. While going to school they are being paid \$80 a month from the government. The Federal Board of Vocational Training has particularly been interested in the opportunity for building back into profitable occupations those soldiers whose lungs were torn by gas, or who were injured in battle, by sending them into the big out-of-doors where they can be trained for service which gives them an open air life.

OREGON

AT a meeting of forest protective agencies held at Klamath Falls, Oregon, October 21, and 22, 1919, representatives of the United States Forest Service, State Forest Service of Oregon, Klamath Indian Service, Crater National Park, Oregon Agricultural College, Western Forestry and Conservation Association and Klamath-Lake Counties Forest Fire Association being present the following resolutions were unanimously adopted:

In view of the importance of the forest industry in the State of Oregon and the large percentage of the taxes of the State paid by said industry, and since insect depredations in the timber are in certain localities a decided menace, we feel that greater attention should be given to forest entomology in the state. We, therefore urge the Oregon Agricultural College to build up a strong department of Forest Entomology and through such department lend assistance to owners of timber in the state in control of insect depredations.

In view of the serious fires which occurred in Oregon the past season and the expense involved in fighting said fires, it is apparent that the appropriation for protection of Oregon and California Grant Lands will not be sufficient to pay the pro rata share of cost of protection of said lands. We, therefore urge upon our Congressional delegation that they use every

effort to see that \$15,000.00 additional be provided for protection of these lands the current fiscal year.

In view of the yearly damage to timber (particularly yellow pine) resulting from insect depredations, and the imperative need of perfecting methods for the control of said depredations, we earnestly request the United States Forest Service to increase its personnel in Oregon for such work and further ask that the service co-operate with and extend assistance to private owners in the State of Oregon looking to more efficient insect control.

Whereas, the grazing areas in the State of Oregon are being reduced yearly owing to homestead occupation, reproduction of forests, etc., a growing congestion on the ranges seriously threatens the live stock industry unless some federal regulation is provided on all public lands; and

Whereas, there are over three million acres in the Oregon and California Land Grant, more or less of which will provide feed for live stock pending disposal under the public land laws;

Resolved, that we respectfully urge the Department of the Interior to adopt and put into effect a policy of leasing the grazing privileges on these Oregon and California Lands to live stock growers, and that the proceeds be used to increase the present appropriation for the protection of said lands from forest fire.

Whereas, there are located in Deschutes, Klamath and Lake Counties, State of Oregon approximately 83,000 acres of land being administered by the Interior Department of the United States Government on which is growing more or less lodgepole pine of little commercial value, but which constitutes an extremely bad fire menace to adjoining National Forest Lands and lands belonging to private individuals or companies on which is growing a stand of commercial yellow pine timber, and as our state laws require the private owners to provide an adequate fire patrol to prevent loss from forest fires, and to do so it has been necessary in the past for said owners to patrol and fight fires upon the Interior Department lands for the protection of their own interests;

Therefore, we urge upon our representatives in Congress the necessity for an appropriation of not less than \$5000.00 per annum to be used for the protection of these lands; and we urgently request the Secretary of the Interior to make request for this amount of money for the above purposes in his next annual budget.

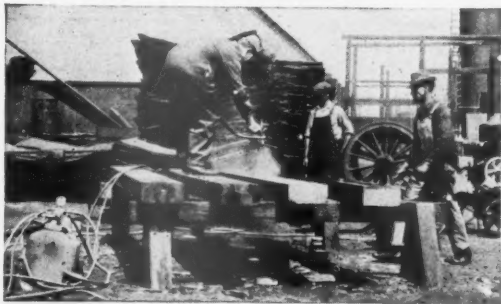
WISCONSIN

THE Forest Products Laboratory, at Madison, has prepared a list of government and state bulletins of value to woodlot owners who wish to market their products. This list will be furnished by the laboratory to anyone upon request.



Replacement of porch columns and joists in framing of three floors is an annual occurrence at most apartment houses of this type.

Arrows point to a badly rotted column on the third floor, to a new column just put in on the second floor, and on the walk to rotted columns and stringers already taken down.



Applying surface treatment by spraying Carbosota on contact surfaces.

The Dangers of Decay

Wooden back porches and stairs of apartment buildings, factories, warehouses, and other industrial structures must be protected against decay to avoid becoming a serious menace to tenants, employees, and the public; likewise to reduce the continual expense of replacement, piece by piece.



The grade of lumber generally employed and the nature of the exposure, cause rapid development of decay and unsuspected weakening of the structure, particularly at points of contact.

It is, perhaps, a very small detail—to protect these structures from premature decay, but a precaution that the builder should encourage from the standpoint of safety and economy. Elimination of decay is physical protection to all, children and adults alike.

Carbosota Creosote Oil, properly applied to points of contact before erection, will retard decay and materially increase the life of even the cheapest lumber.

Used as a stain, it gives the structure a practical and attractive dark brown color at considerably lower cost than paint.

Carbosota Creosote Oil is a pure refined coal-tar creosote, standardized for non-pressure treatments.

Wood Preservation is a "Safety-First" measure.

(Green wood cannot be effectively creosoted by non-pressure processes. It should be air-dry. In regions of moist, warm climate, wood of some species may start to decay before it can be air-dried. Exceptions should be made in such cases and treatment modified accordingly.)

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CANADIAN DEPARTMENT

BY ELLWOOD WILSON

PRESIDENT, CANADIAN SOCIETY OF FOREST ENGINEERS

THE advisory committee which was asked for by the Minister of Lands and Forests of Quebec to discuss with his Chief Forester a revision of the cutting regulations and also the future forest policy of the Province, held its first meeting in Quebec City and after a very interesting discussion agreed to certain recommendations to the Minister. The most important of these was that there be appointed a committee which should represent the lumber and pulp interests, the settlers' interests, and forestry and that this committee should act in an advisory capacity to the Minister of Lands and Forests and his Department in framing regulations for the use and perpetuation of the forests. It is hoped that if this suggestion is adopted most of the present causes of friction between the lumber interests and the settlers can be eliminated.

The forest fire situation in New Brunswick during the past season was better than in the previous year. So many fires were due to carelessness that October ninth was adopted as "Fire Prevention Day" throughout Canada to try and impress on people the necessity for care in preventing all kinds of fires. The total number of fires in New Brunswick's forests for the season were 342—70 per cent set by railroads causing 3.5 per cent of the damage; 7 per cent set by campers causing 31.7 per cent of the damage; 11.5 per cent set by settlers causing 44.1 per cent of the damage; 3.5 per cent set by operators causing 7.1 per cent of the damage; 8 per cent set by accidental and incendiary causing 13 per cent of the damage. Most of the fires occurred in May and June. The above shows that campers and settlers were the chief contributing causes. Eighteen square miles were burnt with a loss of \$154,155. Thirty-six prosecutions were instituted with 29 convictions. About 70 miles of telephone lines were built co-operatively by the Government and the Bathurst Lumber Company and forty more miles will be built to connect with a lookout station. Twenty-six returned soldiers were employed. Four hundred and ninety acres of land belonging to the Bathurst Lumber Company have been set aside as a forest reserve and experimental cuttings are taking place under a plan worked out by Dr. Howe and in immediate charge of Forester W. M. Robertson.

The same kind of work is being done under the supervision of Mr. R. W. Lyons on the Vermillion Limit of the Laurentide

Company, Ltd. The Department of Lands and Forests has been asked to set aside these experimental areas as forest reserves.

The fire season in Quebec has been, from the standpoint of weather, the worst in several years, but the number of fires was not large. Contrary to the experience in New Brunswick, practically no difficulty was had with settlers. The worst fires were caused by dam-keepers and river-drivers of the operators. This is a most curious situation, as these operators are paying the cost of fire protection and are hiring the fire rangers, so that they are not only destroying their own property but it is being done by their own employees. Of course the answer is the lack of an appreciation of the necessity of preventing forest fires on the part of some of the managers of woods operations and their failure to enforce the rules of their departments. Often the sub-managers and higher foremen feel that the fire protection work, in some way, takes away from their authority and interferes with their work, and then too, sometimes they are afraid their men may leave if they are particular about enforcing the fire regulations. The situation is serious and heads of companies should insist that their own men are controlled and not allowed to set forest fires.

Mr. S. L. de Carteret, Forester for the Brown Corporation, will now be in charge of all the timberlands of the Brown Corporation, with headquarters in Quebec City. Mr. de Carteret was, for several years, engaged in working up a scheme for timberland insurance, which he handled very successfully.

Mr. L. A. Nix, graduate of Syracuse University, sometime with the U. S. Forest Service, and who served during the war in the Chemical Division at Edgewood Arsenal, Baltimore, has resigned from the staff of the Forestry Department of the St. Maurice Paper Company and returned to the Laurentide Company for whom he worked before enlisting.

A very interesting article on the work of the Forestry Department of Syracuse University, appears in the Royal Spanish Society of the Friends of Trees.

The Canadian Export Paper Company, Ltd., of Montreal, is sending Mr. W. G. Mitchell abroad to make a study of conditions in the Pulp and Paper Industry in Scandinavia, Finland and Russia.

The Aviation Branch of the St. Maurice Forest Protective Association has completed its work for the season and the planes loaned by the Government will be thoroughly overhauled and put in condition for further experimental work next season. Four hundred pictures 8x10 inches, covering 4,000x3,200 feet each, were taken at an altitude of 5,000 feet. The pictures show all kinds of country, settled, villages, swamps, burns, cut-over, regenerating naturally, planted and all sorts of timber types. Those so far developed and printed exceed all expectations and it is confidently felt that aerial photography will revolutionize timber mapping. The accuracy with which areas in various types, burns, water and so forth can be measured, drainage basins determined and topography studied will add much to the value of the work. Those wishing to buy timberlands, or banks, or other corporations loaning money on timberlands can now be sure of what they are getting for their money.

Alarm is now being felt in Queensland at the very rapid depletion of available timber supplies, particularly softwoods. The Forestry Service is now facing the heavy responsibility of attempting to make good the deliberate dissipation of the forest asset which has characterized the past. Forest reservations have been set aside and now total 3,700,000 acres, but the task of reforestation has been left so late that it will be many years before its effect will be felt.

In Norway it is proposed to build a tunnel to carry logs past a large dam built for water power development. This is an interesting way of solving the problem.

There is practically a complete failure of the white spruce seed crop in the east. The trees in eastern Canada have not seeded for two years and Black Hills and Norway spruce seed has had to be used. Likewise, owing to the rapidly increasing demand, the prices of nursery stock have risen tremendously.

The seaplane purchased by the Brown Corporation, one of two which will be used in mapping their timberlands, was last reported as having flown from New York to Burlington, Vermont. It is expected to arrive at its base on the St. Maurice River shortly.

The plantations made by Chief Forester G. C. Piche, of the Quebec Forest Service, on the drifting sands at Lachute and Ber-

No. 1

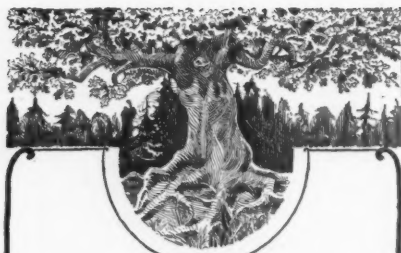
The Making of Southern Pine

FIRST the forest cruiser, lone explorer, and advance agent of the lumberman, judges and chooses with keen, appraising eye the prime stands of virgin woodland. A great sawmill is erected. More thousands are added to the millions of persons in America who derive their livelihood from manufacturing trees into lumber, and another thriving prosperous community is added to the five hundred maintained by producing Southern Pine—that sturdy, dependable material which still is and always has been the least expensive, most easily available building material in the world.

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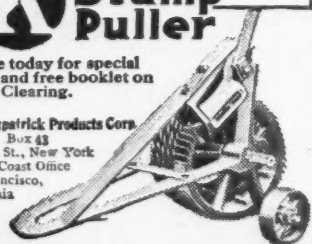
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thier some seven years ago, have made splendid progress and are now six to ten feet in height for Norway spruce and eight to ten feet for white pine. These plantations were made to stop the encroachment of the sand on farming country and have answered the purpose admirably. The growth of the spruce in absolutely pure sand is quite remarkable. It is too bad that the plantations have not been continued.

Messrs. Clyde Leavitt, J. M. Swaine and Arnold Hanssen made a trip to the limits of the River Ouelle Lumber Company at River Manie, in the company of W. G. Power, President of the Canadian Lumbermen's Association, to investigate the ravages of the spruce budworm and spruce bark beetle. They report that the trees are beginning to recover from the attack but that the number of spruce trees blown down as the result of cutting to a diameter limit is very large, causing a great deal of waste.

A course in paper-making has been started in the Laurentide Night School with

forty-five entrants. The course will begin with lectures on forestry and will be followed by others on logging, wood preparation, grinding, sulphite making, paper-making, purchasing, selling, engineering and management. One hundred and fifty pupils are enrolled for the winter session of the school.

Robson Black, Secretary of the Canadian Forestry Association, has finished a most successful lecturing trip through the Prairie Provinces. He has held ten public meetings in Winnipeg alone, sometimes at the rate of two or three per day, addressing business men, bankers, mortgage companies and so forth. In Prince Albert he had an audience of 700 men and women. Much enthusiasm for the conservation of timber resources was aroused and the idea has taken firm root. The Forestry Car which is making a tour of the country has met with the greatest success.

The reports of damage from forest fires in the Prairie Provinces during the past summer will run into millions of dollars.

FOREST SCHOOL NOTES

UNIVERSITY OF CALIFORNIA

THE Forestry Club has had three interesting meetings since October 1st. Twenty-five men left Berkeley early Sunday morning, October 5th and went by train and boat to Fairfax, for a hike through the picturesque hills of Marin County. The route of the trip was across a chapparal covered ridge to the new La Guitas reservoir of the Marin Municipal Water District. This artificial lake with its well forested watershed is now full to capacity for the first time and has added greatly to the natural beauties of the region. After following down La Guitas Creek to the junction of the Little Carson Creek a halt was made for lunch beneath the shade of some fine redwood, Douglas fir and Tanbark oak trees. The afternoon trip brought us back to Fairfax by way of the headwaters of the Little Carson. Twenty-five species of trees were noted during the day.

The next regular meeting was held on October 17th, when Professor David T. Mason spoke to the club about his work with the Treasury Department in the administration of the income tax to the lumber industry.

An open air meeting in the Berkeley Hills was held on October 28th at the old camp fire place in Telegraph Canyon. After a hearty meal of "weenies," coffee and pie, Mr. S. B. Detwiler, who is in charge of the White Pine Blister Rust eradication, told the boys something of the character of the work being done in scout-

ing for the disease and the nature of the quarantine by means of which it is hoped that it may be kept out of the western forests. Mr. Posey, who is directing the work in California and several of his field men were also guests of the forestry club at this camp fire meeting.

During the regular business session it was decided that the forestry club should recommend to the Associated Students' organization the planting of a memorial grove of Sequoia gigantea on a suitable site in Strawberry Canyon to the 80 University of California men who gave their lives in the World War. It is hoped that the work can be done as the "Labor Day" project by the entire student body on February 29, 1920. It has been the custom for several years for students and faculty to lay aside regular duties on this extra day and all join in some work of improvement of beautification needed about the campus. The forestry club feels that the planting of such a memorial grove is the most fitting way in which the coming Labor Day can be spent.

Professor Woodridge Metcalf spent a week end recently with the Santa Cruz high school forestry class which is being conducted by R. E. Burton, a former president of the University of California Forestry Club. An interesting field trip through some of the cut over lands in the vicinity of Santa Cruz was made the opportunity for pointing out the necessity for permanent forests in this region. Many

(Continued on Page 1563)

\$7,500,000**BROWN COMPANY**

(Formerly the Berlin Mills Company)

6% Serial Gold Debenture Bonds—Series "A"

AUTHORIZED \$15,000,000

OUTSTANDING \$7,500,000

Dated November 15, 1919.

Interest payable May and November 15.

Due in annual installments of \$375,000 each November 15, 1920 to 1939 inclusive.

Interest payable without deduction for any Federal Normal Income Tax up to 2%

OLD COLONY TRUST COMPANY, BOSTON, Trustee

HISTORY AND BUSINESS

The Brown Company, founded in 1852, is the largest manufacturer in this country of bleached sulphite fibre pulp and kraft wrapping paper and it also manufactures bond paper, lumber and allied products. Sales in recent years have averaged more than \$23,000,000 annually. Its operations in Canada are conducted through a subsidiary, the Brown Corporation, of Canada, of which the Brown Company owns all the capital stock.

PROPERTY

The mill properties at Berlin and Gorham, N. H., consist of two paper mills, two sulphite fibre mills, a saw-mill and five hydro-electric plants with an installed capacity of 25,000 H. P. and a steam power plant with a capacity of 20,000 H. P.

The Canadian plant consists of a pulp mill and water-power for manufacturing sulphate fibre, which product is shipped free of duty to the American plants.

A practically perpetual supply of raw material is assured by ownership in fee simple of more than 400,000 acres of timber land in Maine, New Hampshire and Vermont, and the acquisition in Canada through the Brown Corporation of more than 800,000 acres in fee simple and stumpage and about 1,700,000 acres in timber limits under perpetual license. Total holdings are over 4,530 square miles, conservatively estimated to contain 15,000,000 cords.

ASSETS

The cash investment in the American mill properties alone is over \$14,000,000.

After the application of the proceeds of these bonds the net quick assets of the Brown Company will be in excess of \$12,000,000, and the tangible assets applicable to this issue in excess of \$38,000,000.

The combined tangible assets of the affiliated companies are in excess of \$50,000,000.

EARNINGS

Earnings of the Brown Company, as certified by Messrs. Niles & Niles, Certified Public Accountants, for the last five fiscal years, after taxes, depreciation and interest have averaged \$2,190,222, or nearly five times the interest on this issue, and for the last three fiscal years have averaged \$3,102,369, or nearly seven times the interest on this issue, to which are to be added the earnings of the Brown Corporation for the last three fiscal years, averaging \$507,617.

In addition to the above earnings, special reserves have been set up by the Brown Company during the last five years averaging \$445,658, and by the Brown Corporation during the last three years averaging \$272,617.

PROVISIONS

The Indenture securing these bonds has been so drawn that no further mortgage may be placed upon the present assets while any of this issue is outstanding. The Company covenants to maintain net tangible assets of 300% of Series "A" at any time outstanding, and total tangible assets of 200% of total liabilities, so long as any bonds issued under this Indenture remain outstanding. Furthermore, the Company will maintain net quick assets, exclusive of inter-company accounts, at not less than 75% of all bonds of Series "A" and previously issued funded debt outstanding, and at not less than 50% of the total funded debt outstanding during the life of any bonds issued under this Indenture.

MATURITIES	APPROXIMATE	
	PRICE	YIELD
1920 to 1922 inclusive.....	100	6.00%
1923 and 1924.....	99½	6.15%
1925 to 1929 inclusive.....	99	6.15%
1930 to 1934 inclusive.....	98½	6.15%
1935 to 1939 inclusive.....	98	6.15%

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The statements contained herein are not guaranteed, but are based upon information which we believe to be accurate and reliable, and upon which we have acted in the purchase of these bonds.

BOOKS ON FORESTRY

AMERICAN FORESTRY will publish each month, for the benefit of those who wish books on forestry, a list of titles, authors and prices of such books. These may be ordered through the American Forestry Association, Washington, D. C. Prices are by mail or express prepaid.

FOREST VALUATION—Filibert Roth.....	\$1.50
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FORESTRY PRIZE ESSAY OFFER

A PRIZE essay on forestry is being offered by the Indiana Division of Forestry, the subject being: Private versus State Forests.

The contest is open to the pupils of both public and parochial schools. For the best essay from the seventh and eighth grades, respectively, a prize of \$5.00 will be given. For the best essay from each of the high school classes a prize of \$7.50

will be given. The offer is made to all schools doing work equivalent to the grade or high schools. The essay must not exceed 2,000 words. It must be mailed not later than May 15, 1920, to the State Forester at Indianapolis, Indiana, Room 7, State House. Contestants should write the State Forester for particulars and rules governing the contest.

BOOK REVIEWS

THRIFT AND CONSERVATION, by J. F. Chamberlain. J. B. Lippincott, Philadelphia. Price, \$1.40.

Very aptly is the President quoted in this little book, just from the Lippincott presses—"To practice thrift in peace times is a virtue and brings great benefit to the individual at all times." During the last few years, and especially since the beginning of the war, the term "thrift" has been much more in the public mind and on the public tongue than heretofore. Men and women are talking thrift and economy; children are writing essays on thrift and are earning and saving as never before. There are lectures and published plans and outlines telling how to earn and invest and save, and the authors have set forth in this book the needs for this teaching of thrift, together with many practical applications of the thrift principles to the life of the people as made possible through such teaching. The causes leading up to the spend-thrift practices of our people are set forth and the necessity for rational habits in proper saving and economy are made plain. And the distinction between true and false economy is carefully pointed out all through the book, i. e., thrift does not consist in hoarding or in miserly practices. One does not save in order to have simply but in order to have that he may use wisely. He saves against the time of emergency, in his own life and those dependent upon him, and that he may do his part in community or state through the channels of public or private service. So changed is the attitude of the public mind that where formerly a man of thrift and saving tendencies was looked upon with something of contempt and pity, now the man who is not reasonably thrifty or economical is the object of more or less adverse criticism. It has at last become dignified to conserve instead of waste—to practice thrift rather than spend foolishly and we predict that this book by the Chamberlains will point the way for many who wish sincerely and intelligently to establish the habits of thrift.

The 1919 Forest Club Annual, of the College of Forestry and Lumbering, at the University of Washington, Seattle, which is just out, is full of interest and value. Its compilation reflects great credit and the organization, and editors of the Annual, are to be congratulated on the publication. A few copies are available to interested foresters and lumbermen, who may procure a copy by writing to the Secretary of the Forest Club, University of Washington, Seattle, Washington.

FOREST SCHOOL NOTES

(Continued from Page 1560)

of the thirteen boys in the class are planning to take up forestry in the University.

Professor Walter Mulford has been appointed a member of the Research Committee of the Save the Redwoods League, which organization is conducting a very active campaign for the setting aside of some of the finest bodies of redwood in Humboldt County as either National or State parks. The chairman of this committee is Meritt B. Pratt, now deputy State Forester, but formerly assistant professor of Forestry at Berkeley.

UNIVERSITY OF MONTANA

THE Forest School opened on October 1st with an enrollment of 60 students, of whom nearly half are non-residents of Montana. States represented are South Dakota, Illinois, Ohio, Iowa, California, Washington, Colorado, Connecticut, Indiana, New York, Wisconsin, Missouri, Minnesota, Nebraska, Massachusetts, South Dakota, Kansas, and Idaho. Also one student from Canada, one from New Zealand, and two from the Philippine Islands.

The Forest School counts itself very fortunate this year in having among its students Felix Franco, and Placido Decanay who are foresters from the Philippine Islands. These gentlemen are native Filipino foresters of a group of five Philippine forest officers who are being sent to schools of forestry in this country at the expense of the Philippine government. Both of these men have graduated from the government school of forestry in the Philippine Islands and have had experience as Forest Supervisors in the Philippine Forest Service.

The Forestry Club has started its series of lively meetings. Special consideration is being given this year by the members of the Forestry Club to the question of a national forest policy.

The annual meeting of officers of the Forestry Club resulted in the election of H. Whisler, a senior student, as president of the Club for the forthcoming year. R. A. Williams, William Zeh and G. M. DeJarnette, all junior students, were elected treasurer, secretary and vice-president.

Dean Skeels recently visited the annual session of the Pacific Logging Congress at Portland, Oregon, and a convention of representatives of the faculties of the schools of Forestry in the state universities of California, Oregon, Washington, Idaho and Montana. Dean Skeels has made an interesting report of the proceedings of the Logging Congress. Of especial interest to foresters of the northwest was the consideration given by the Logging Congress to conservation and forest protection prob-

lems in general and particularly to the issues which are leading towards the definition of a stronger policy of forestry for the nation.

Steps are being taken through state authorities for the acquisition of the Fort Missoula timber reservation as a working forest for the School of Forestry.

The faculty is co-operating in an important way with the Forest Service members of the Missoula branch of the Society of American Foresters in preparing a preliminary plan for such part of a national forestry policy as will apply to the intermountain region.

As a part in furthering a better policy of forestry Dean Skeels and Professors Spaulding, Fenska and Lansing are also preparing material for a complete report to the state authorities of Montana regarding the present forestry problems relating to state lands and looking towards improvement of the state policy for forestry matters in general.

New features for the short course for Forest Rangers which has for twelve years been held during the winter quarter of the school year will be courses of specialization in grazing and forest engineering.

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By Tenley School: Elmer Kidwell, Benjamin Perry, Aubrey Reed, Hart Sonneman.

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NEW HAVEN, CONN.

By Mr. George A. Cromie: Lieut. Samuel Osborn Cromie.

MIDDLETON, GA.

By Middleton School: Hascal Carl Smith.

WARE COUNTY, GA.

By Canteen Unit, American Red Cross: James Jules Beaton, James Brown, Alvin Claude Bozeman, Eugene Campbell, Fred Capps, Claude De Witt Crumless, Norman Ernest Daniels, Erley Davis, Dellie Gilliard, Lewis Gillis, Ivey Lee Gunter, Franklin Lewis Henderson, Aaron Holt, Lewis H. Hopkins, John Kelly, Warren Thompson Kent, Archie B. Liles, L. D. Moody, Clyde Mott, James A. Pierce, Milton Worth Porter, Leon Ray, William Rogers, Wadley E. Sharpe, Ralph Smith, John Spaulding, Charles S. Walden, Lonnie James, Jefferson D. Stow, Frank Teuten, Peter Archie Thrift, Andrew Thrift, Alfred W. Turner, Dewey White, Gerald Yarborough.

CHICAGO, ILL.

By Flossmoor Country Club: Corp. James M. Frothingham.

SOUTH BEND, IND.

By Impromptu Club: Howard Urquhart Snyder.

BINGHAM, MAINE

By Kennebec Chapter, D. A. R. & Century Club: Bingham, Maine heroes.

ORLANDO, MAINE

By Richard Gott: Wm. P. Hutchins.

ANDOVER, MASS.

By Mrs. C. W. Ward: Andrew K. Dunn.

SHARON, MASS.

By Mrs. W. E. Clark: Charles R. Wilbur.

MANCELONA, MICH.

By Antrim Iron Company: Jakow Shelobodi, William Bohl, Donald May, Venerable Lameron, George E. Puckett.

FORT OMAHA, NEB.

United States Army Balloon School: Walter J. Sorenson, Ellsworth B. Rinehart, Albert Lewis Coldiron.

SPRING LAKE, N. J.

By Dr. and Mrs. G. D. Murray: Jane A. Delano.

WEST COLLINGSWOOD, N. J.

West Collingswood School: Theodore Roosevelt, Robert Shields.

CHAUTAUQUA, N. Y.

Chautauqua Bird and Tree Club: Grant S. Norton.

EAST HAMPTON, LONG ISLAND, NEW YORK

By Dr. H. Lawrence Dowd: Meredith L. Dowd.

SCHNEVUS, N. Y.

By Mr. Thomas Broxholm: Samuel F. S. Broxholm.

WHITESBORO, N. Y.

Men's Bible Class of First Presbyterian Church: Copie Van Hessen, Fred Lamphere, Harry Sautter.

CLEVELAND, OHIO

By Theodore Dluzyuski: Walter Dluzyuski.

COLUMBUS, OHIO

By Independent Protestant Church: Richard Ninchart, Walter Biderman.

NORTH LIMA, OHIO

By Trustees of Union Cemetery: Soldiers of Beaver Township who served in the World War.

CROSS CREEK, WASHINGTON COUNTY, PA.

By Mrs. Samuel Sturgeon: Theodore Roosevelt.

DOWNINGTON, PA.

By Frances Edge McIlvaine: Randolph Breese.

LEWISTOWN, PA.

By Miss Maggie E. Stine: Sergt. Ernest E. Stine, Paul N. Bostain.

PENBROOK, PA.

By Penbrook Community Civic Club: Boys of Penbrook District who died or were killed in Great War.

PROGRESS, PA.

By Penbrook Community Civic Club: Boys from Progress District who gave their lives in the Great War.

NASHVILLE, TENN.

By Robertson Academy: Lieut. John W. Overton.

ALEXANDRIA, VA.

By Parish Aid Society, Christ Church, which Washington attended: Sergt. Major John M. Leadbeater, Lieut. George Moncrief Arderton.

ST. ALBANS, VT.

By Woman's Club: Company B. of St. Albans, Machine Gun Company.

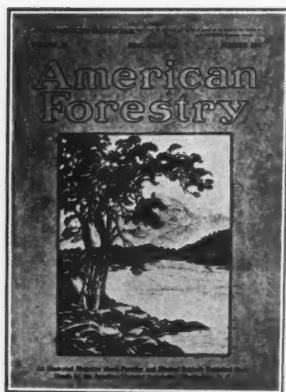
APPLETON, WIS.

Appleton High School: Edward Mach.

KOHLER, WIS.

By Village of Kohler: Soldiers and Sailors, Sheboygan County.

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UNIVERSITY OF WASHINGTON

THE College of Forestry at the University of Washington opened the first quarter of the school year with an enrollment of 135—the largest in the history of the school. Students are registered from many sections of the United States and from Chile, Siberia, Sweden, England and the Philippines.

At a recent meeting of the Forest Club, Mr. F. E. Pape, Washington State Forester, outlined the four routes for the airplane fire patrol to be instituted in this state next summer.

The Hon. Clark V. Savidge, Commissioner of Public Lands of Washington, also addressed the foresters. He brought out the surprising fact that if all the state lands of Washington were in one block they would make an area twice the size of the state of Delaware. These lands are being handled solely for the benefit of the educational institutions of the state, and the schools are now realizing the interest on sixteen million dollars derived from state lands. While no forestry other than fire protection is being practiced at the present time, Mr. Savidge is looking forward to forest management of these lands when favorable conditions for making a start have been worked out.

The Forest Club, composed of the students in the College of Forestry, has entered on what promises to be the most successful year yet experienced, and the seventy entering freshmen are showing great interest and enthusiasm in the activities of the organization. The officers for the ensuing school year are, Willis G. Corbitt, of Seattle, president; S. S. Andrews, Boulder, Colorado, vice-president, and J. Kenneth Pearce, Portland, Oregon, secretary-treasurer. Arthur K. Roberts, Tacoma, Washington, will edit the 1920 "Forest Club Annual," of which Jack Shank, Alton, Illinois, is business manager.

TRI-STATE FORESTRY CONFERENCE

A CONFERENCE of foresters of Indiana, Ohio and Illinois held at Indianapolis on October 22 and 23, and very well attended, developed particularly valuable discussion on national and state forest policies. Resolutions were adopted demanding public and legislative action to assure a permanent timber supply. Others were as follows:

Resolved, That a system of taxation on timberlands be adopted which will discourage premature and wasteful cutting and encourage forest renewal. Be it

Resolved, That the states should greatly increase their forest holdings by the purchase of young second-growth and land

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adapted to reforestation made possible by a bond issue of 50 to 100 years maturity so the burden may be equally distributed through generations. Urging that large holdings by the states will present a steady and permanent source of supply which will stabilize timber prices

Resolved, That this Conference urges upon our representatives in the Congress, the necessity for largely increased appropriations under the purchase clause of the Weeks Act, to extend the area of national forests, and particularly into the hardwood regions of West Virginia, Kentucky and Tennessee, from which the tree states concerned already draw a large portion of their hardwood supply.

Be it further urged, that the Federal Congress appropriate adequate funds for co-operation with the states in forestry, as it is doing in road building, agricultural extension, vocational education and other activities, with the especial object of encouraging farm forestry extension under the Smith-Lever Act, reforestation of idle lands and protection against fire. Be it

Resolved, That the states launch an extensive and thorough campaign through the press, the schools, the pulpit and mails, to arouse the public to the need of a state forest policy and necessity of action toward the assurance of a permanent timber supply.

It is furthermore urged, that forestry education should be made a progressive part of the public school curriculum.

THE WEEKS LAW POLICY

REPRESENTATIVE Zebulon Weaver has introduced a bill (H. R. 10372) into Congress asking for an appropriation of two million dollars a year for the next five years "to be expended under the act of March 1, 1911" (the Weeks Law), for the purchase of forest lands in the White Mountains of New England and the Southern Appalachians, with the avowed purpose of protecting the headwaters of our larger streams.

This is not a new policy, but is a continuation of a policy endorsed by Congress a number of times. The purchases began in 1911 with an appropriation of two million dollars a year for five years. As three million dollars of this was allowed to lapse, it was re-appropriated by Congress two or three years ago. Last year this policy was again endorsed, but only \$600,000 was appropriated, owing to the exceptional conditions due to the war.

The demand is now being made to put this policy on a more business-like basis by again making the expenditures cover a period of years. This has two very distinct advantages. It allows the government to compete with other possible purchasers, by allowing them to know that they will have a definite amount to spend for the next several years. It also enables the Forest Service, which is engaged in the

acquisition of the lands, to maintain a very much more effective and permanent organization of experts who are already trained in the various activities connected with purchasing.

THE SECOND SOUTHERN FORESTRY CONGRESS

THE second meeting of the Southern Forestry Congress will be held in New Orleans, Louisiana, Wednesday, Thursday and Friday, January 28, 29 and 30, 1920. It will be recalled that the first Congress was held in Asheville, North Carolina, three years ago.

It is planned to devote the first day of this meeting to a discussion of the needs of the South for forestry, with special reference to the timberland policy for privately owned lands now being proposed by the Federal Government. The United States Forester, Colonel Henry S. Graves, is expected to be present to give the views of the Forest Service on this important question, while leading men in other lines will be asked to present the subject from the points of view of the State, the lumberman and the local landowner.

On the second day a more general program will be carried out, consisting of discussions upon such subjects as the acquisition by the Federal Government of forest lands for the production of timber, as well as for the protection of streams; state forestry organizations and policies; forest fire prevention; the relation of grazing to timber production on non-agricultural lands; the future of the naval stores industry, etc. The program for the third day has not yet been outlined, but it will probably be given over to sectional meetings, or to field excursions, or both. There will be fewer set speeches than is usual at such meetings, because it is planned to develop free discussion amongst the delegates in attendance. The various forestry and lumbering associations, landowners' associations and manufacturers' associations interested in timber production and in the proper development of Southern lands are being asked to co-operate in this meeting, which it is expected will be one of the most important ever held in the South.

Colonel Joseph Hyde Pratt, Director of the North Carolina Geological and Economic Survey, Chapel Hill, N. C., is now president of the Congress, and Mr. J. S. Holmes, State Forester, Chapel Hill, is secretary. Mr. R. D. Forbes, Superintendent of Forestry, Louisiana Department of Conservation, New Orleans, has kindly consented to act as assistant secretary, and will attend to all local arrangements. It is hoped that all the Southern States will be fully represented at this Congress.

NEW FIRM OF FORESTERS

WILLIAM L. HALL has resigned his position as Assistant Forester in the United States Forest Service to head the

firm of Hall, Kellogg & Company, with offices in the Otis Building, Chicago. The firm is to deal in timberlands and forest products, make forest surveys and to develop timberland investments. Mr. Hall was with the Forest Service for twenty years. His first undertaking was the formation and organization of a definite plan for timber planting operations for the Government and assistance to private owners who desired to grow timber. After putting this work upon a sound and practical basis, Mr. Hall was next asked to develop the branch of Forest Production in the Forest Service, with which he was connected for a long time and during which period the present widely known researches and investigations in timber testing, timber treating, and pulp and paper making were planned and culminated in the establishment of the Forest Products Laboratory at Madison, Wisconsin. For the past eight years Mr. Hall's energy has been devoted to the examination and recommendation for purchase by the National Government of 1,700,000 acres of timber and cut-over land in the White Mountains and Southern Appalachians, during which time he has gained an experience in timber examination, land classification, the handling of complicated land titles and the blocking up of holdings into suitable units for administration that is of a particularly unique and valuable character. During the war Mr. Hall was assigned to a conspicuous part in organization of the 20th Engineers, and at the close was a major in training for overseas service. Recently he has been making a survey of the wood-using industries of the Middle West for the purpose of determining their supply of raw material and the development of plans for a national forest policy, including the necessary part to be played therein by the Government, the timberland owners and the Public.

R. S. Kellogg, the other principal member of the firm, also began his professional and business career in the Forest Service, entering that organization in 1901 and continuing until 1910. During this period he had many important assignments covering all parts of the United States and Alaska. He made numerous forestry investigations in various parts of the country and brought out a large number of important publications. He had an exceedingly important part in the early conservation movement which focused the attention of the whole country upon the necessity of conserving supplies of timber and other natural resources. To Mr. Kellogg's efforts are due the plan of collecting annual statistics of forest products. The work was originally instituted by him and he wrote many of the earlier reports published by the Forest Service and the Bureau of the Census.

In 1910 Mr. Kellogg left a promising career in the public service to become Secretary of the Northern Hemlock and Hardwood Manufacturers' Association. Later

he became Secretary of the National Lumber Manufacturers' Association, and in 1918, Secretary-Treasurer of the Newsprint Service Bureau, with offices in New York. He will retain this position, his association with the new firm being in the capacity of stockholder and director.

VERSATILITY OF WOOD

A PAIR of green silken sox woven from fine fibers made from spruce and a coil of stout binder twine spun from twisted strands of fir are two of the typical products of western woods displayed on a panel just received in the office of the West Coast Lumbermen's Association in Seattle from the Forest Products laboratory at Madison, Wisconsin.

The exhibit has been arranged as a demonstration of the practical results obtained through the research work at the Madison laboratory and merely goes to illustrate once more and to emphasize that sawn and finished lumber is the crudest commercial product of the trees.

Among the other interesting specimen products included in the exhibit are: furniture reed and braid, used in making "wicker" furniture; paper rug yarn, extensively used in making bath-room mats and small household rugs; linoleum, with attractive patterns, made from wood flour and linseed oil; paper bagging that can be used in place of the jute bags now commonly employed in sacking grain; paper absorbent, which was quite generally used during the war as a successful substitute for absorbent cotton; artificial lath, produced from a mixture of wood flour and used as a substitute for wood lath; basket braid, made from twisted strands of paper; insulating rods and tubes, binder twine, paper cloth, glue tissue wrapping twine, paper webbing and rope, all produced from paper which in turn has been produced from native wood.

The basis for products such as phonograph records, insulating tubes and artificial lath is wood flour, which consists of spruce wood chemically treated and ground into a fine powder. The versatility of this flour is demonstrated by the fact that it is used in the peaceful art of making toys as well as in the more violent purpose of manufacturing dynamite. A case containing gunpowder made from wood flour is included in the exhibit.

Manufacture of clothing from artificial silk, produced from spruce, presents wonderful possibilities. The pair of sox on display is a mere example. A strip of silken cloth, tied with a silken cord—all made from spruce—show what can be done in this direction.

ODOR AND TASTE OF WOOD

MOST of our native woods are without pronounced odor or taste, but woods of the laurel family, of which sassafras and California laurel or myrtle are representatives, have a distinct spicy odor and taste.



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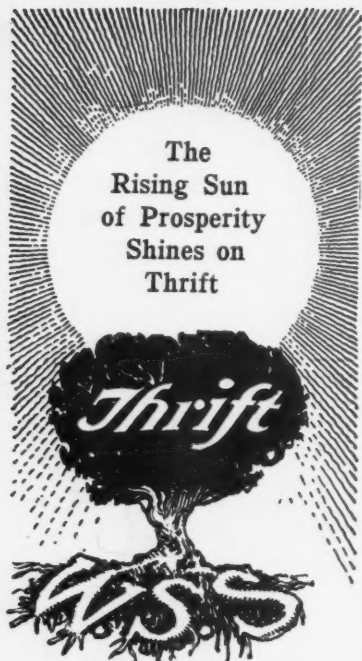
Phone Main 8274

Port Orford cedar of the Pacific coast has a very spicy, resinous odor; other cedars have a more aromatic odor, especially the pencil cedar or juniper. Hemlock has a slightly sour odor while cypress is somewhat rancid. Except in cedars and junipers these odors are scarcely strong enough to taint food unless it is brought into direct contact with the wood as in butter tubs or boxes. For wooden pie plates, butter dishes, bowls, buckets, candy pails, kegs and barrels, only woods are used which are without taste.

FOREST FIRE AIR PATROL

DISTRICT 5, of the United States Forest Service, reported the following interesting data on the forest fire patrol, via the air, for the two months of July and August: 745 flights, 92,605 miles of flight, 8 planes daily in service, 16,000,000 acres national forest land covered twice daily, 5,000,000 acres private timber covered twice daily, 6 forced landings, 1 fatality.

In addition to the above terse figures, the District Forester reports the system as 85 per cent efficient in discovery of fires, but amends this by stating that it will shortly be practically 100 per cent efficient. Equipping the planes with wireless telephones will largely assist in reaching this state of perfection.



FORESTERS ATTENTION

AMERICAN FORESTRY will gladly print free of charge in this column advertisements of foresters, lumbermen and woodsmen, discharged or about to be discharged from military service, who want positions, or of persons having employment to offer such foresters, lumbermen or woodsmen.

POSITION wanted by technically trained Forester. Have had fourteen years experience along forestry lines, over five years on the National Forests in timber sale, silvicultural and administrative work; three years experience in city forestry, tree surgery and landscape work. Forester for the North Shore Park District of Chicago. City forestry and landscape work preferred, but will be glad to consider other lines. Can furnish the best of reference. Address Box 600, Care American Forestry Magazine, Washington, D. C. (1-3)

YOUNG MAN recently discharged from the U. S. Navy, wants employment with wholesale lumber manufacturer; college graduate; five year's experience in nursery business; can furnish best of references. Address Box 675, Care American Forestry Magazine, Washington, D. C. (1-3)

Man to be discharged from the Army September 30th desires position in forestry work, with lumber or railroad company or assisting in investigations of utilization of wood products. Would accept position in other work. Is married man, graduate of Michigan Agricultural College, 1913. Has had experience in orchard work, clearing land, improvement cuttings, planting and care of nursery, pine and hardwood transplants, orchards and larger trees, grading and construction of gravel roads, and other improvement work. Has executive ability and gets good results from men. Please address Box 860, care of American Forestry Magazine, Washington, D. C. (9-11)

POSITION wanted by technically trained Forester; college graduate, 37 years of age and married. Have had seven years' experience in the National Forests of Oregon, California, Washington and Alaska. Also some European training. At present employed on timber surveys as chief of party in the Forest Service. Desire to make a change and will be glad to consider position as Forester on private estate, or as city Forester. Will also consider position as Asst. Superintendent of State Park and Game Preserve in addition to that of Forester. Can furnish the best of references. Address Box 820, care American Forestry Magazine, Washington, D. C.

ARBORICULTURIST is open to an engagement to take charge of, or as assistant in City Forestry work. Experience and training, ten years, covering the entire arboricultural field—from planting to expert tree surgery—including nursery practice, and supervision in the care and detailed management of city shade trees. For further information, address Box 700, care of American Forestry.

WANTED—Position as Forester and Land Agent. Technically trained forester, 35 years old. Practical experience along all lines included under the duties of the above positions. Former Captain, Field Artillery. Address Box 840, care American Forestry, Washington, D. C.

WANTED—Position with Lumber Company or Private Concern by technically trained Forester with five years practical experience. Box 820, care American Forestry.

A FORESTRY graduate with several years experience in forest work and at present employed along technical and administrative lines desires responsible position with private concern operating in and outside the United States. Address Box 870, care of American Forestry Magazine, Washington, D. C.

A CHRISTMAS SUGGESTION

Are you puzzled about the selection of Christmas gifts?

Why not give a year's subscribing membership in the American Forestry Association as a gift. It will cost you \$3.00, and the member will receive American Forestry Magazine for a year.

This will be an ideal Christmas gift for a child or an adult.

Send the money to the Association and a Christmas Card will be sent you to present on Christmas Day.

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For eighty years, Disstons have been leaders in the art and science of saw-making—have, as a matter of fact, invented and developed much of the saw-making machinery in use in their plant today.

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